# CRITERION VI – GOVERNANCE, LEADERSHIP AND MANAGEMENT

**6.5.3 - Incremental improvements made for the preceding during the year with regard to quality (incase of first cycle) Post accreditation quality initiatives (second and subsequent cycles)**

**Relevant supporting document**

- **Report on CO & PO**
- **Report on stakeholders feedbacks**
- **Repor on Internationalization**
- **Ranking and accreditations of University**

GOKUL GLOBAL UNIVERSITY

Approved By Govt. of Gujarat
(Recognized by UGC under Section 22 & 2(f) of 1956)
(Gujarat Private State University Act 4 of 2018)

# COURSE STRUCTURE

## Bachelor of Science

## Zoology

## Under

## National Education Policy (NEP)-2020

Faculty of Science
Gokul Science College
University Campus, State Highway-41,
**Siddhpur** - 384151, **Dist.** Patan, Gujarat, INDIA, **Mobile :** 9510973863
**E- Mail :** dean.fac.sci@gokuluniversity.ac.in, **Website :** www.gokuluniversity.ac.in

**Bachelor of Science Program outcomes (PO)**

| PO No. | Program Outcome Description |
|---|---|
| PO1 | Foundational Knowledge: Graduates will possess a strong foundation in the fundamental concepts, theories, and principles of their chosen discipline, as per the prescribed curriculum. |
| PO2 | Practical Skills: Students will acquire practical skills relevant to their field, including laboratory techniques, data collection, analysis, and interpretation. |
| PO3 | Critical Thinking: Graduates will develop critical thinking skills to analyze, evaluate, and solve scientific problems, applying logical reasoning and evidence-based approaches. |
| PO4 | Effective Communication: Students will demonstrate effective communication skills, both orally and in writing, to convey scientific ideas and findings to different audiences. |
| PO5 | Collaboration and Teamwork: Graduates will work collaboratively in teams, engaging in effective communication, cooperation, and coordination to accomplish shared objectives. |
| PO6 | Information Literacy: Students will develop information literacy skills to access, evaluate, and utilize scientific information from diverse sources, including digital resources. |
| PO7 | Ethical Awareness: Graduates will demonstrate ethical awareness and responsibility in scientific practice, understanding the importance of integrity, honesty, and ethical conduct. |
| PO8 | Lifelong Learning: Students will develop a commitment to lifelong learning, staying updated with advancements in their field and engaging in continuous professional development. |
| PO9 | Societal Impact: Graduates will recognize the social and ethical implications of scientific knowledge and contribute positively to society through their discipline. |

**B.Sc. Zoology:**

| PSO No. | Program Specific Outcome Description |
|---|---|
| PSO1 | Zoological Knowledge and Diversity: Graduates of the B.Sc. Zoology program will acquire a comprehensive understanding of animal biology, including animal morphology, physiology, taxonomy, and behaviour. They will be able to identify and classify diverse animal species. |
| PSO2 | Animal Conservation and Wildlife Management: Graduates will demonstrate an understanding of animal conservation principles and possess skills to manage and protect animal habitats. They will contribute to wildlife conservation efforts, conduct research on animal behaviour and ecology, and promote sustainable wildlife management practices. |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF ZOOLOGY**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Certificate | UG | I | Discipline Specific Course (Major-1) | CPZOO101DSC | Non-Chordates I: Protista To Pseudocoelomates | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | CPBOT101DSC | Introduction to Plant world | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Minor) | CPCHE101DSC / CPMIC101DSC | General Chemistry-I / Introduction to microbial world | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi-Disciplinary Course | CP101MDC | Basics of computer application | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | CP101AEC | Communication Skills-1 | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Indian Knowledge System | CP101IKS | Indian Constitution | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | CP101SE | Photography Basics | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | | | 550 |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF ZOOLOGY**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Certificate | UG | II | Discipline Specific Course (Major-1) | CPZOO201DSC | Non-Chordates Ii: Coelomates | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | CPBOT201DSC | Morphology and tissue system in plants | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Minor) | CPCHE201DSC / CPMIC201DSC | General Chemistry-II / Systematic bacteriology | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi-Disciplinary Course | CP201MDC | Basic Statistics | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | CP201AEC | Communication Skills-2 | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Value added Course-I | CP201IKS | Fundamentals of Nutrition | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | CP201SE | Cyber Security | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | | | 550 |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF ZOOLOGY**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Diploma | UG | III | Discipline Specific Course (Major-1) | DPZOO301DSC | PRINCIPLES OF ECOLOGY | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | DPZOO302DSC | CHORDATES-I | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Major-3) | DPBOT301DSC | MYCOLOGY AND PHYTOPATHOLOGY | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi-Disciplinary Course | DP301MDC | ARTIFICIAL INTELLIGENCE(AI):- Knowledge Representation and Reasoning | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | DP301AEC | CREATIVE WRITING ESSENTIAL | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Indian Knowledge System | DP301IKS | YOGA | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | DP301SEC | PRESENTATION SKILLS | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | | | 550 |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF ZOOLOGY**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Diploma | UG | IV | Discipline Specific Course (Major-1) | DPZOO401DSC | COMPARATIVE ANATOMY OF VERTEBRATES | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | DPZOO402DSC | CHORDATES-II | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Major-3) | DPBOT401DSC | ANATOMY OF ANGIOSPERMS | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Discipline Specific Course (Minor) | DPCHE401DSC | INRGANIC CHEMISTRY | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | DP401AEC | PERSONALITY DEVELOPMENT | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Value added Course-I | DP401VAC | SPORTS AND FITNESS | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | DP401SEC | STRESS MANAGEMENT | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | | | 550 |

<table>
<tr><th colspan="8">GOKUL GLOBAL UNIVERSITY, SIDHPUR</th></tr>
<tr><td colspan="2">Programme Code</td><td colspan="2">CPZOO</td><td colspan="2">Programme Name</td><td colspan="2">Certificate Programme of Zoology Science</td></tr>
<tr><td colspan="2">Course Code</td><td colspan="2">CPZOO101DSC</td><td colspan="2">Semester</td><td colspan="2">I</td></tr>
<tr><th colspan="8">NON-CHORDATES I: PROTISTA TO PSEUDOCOELOMATES</th></tr>
<tr><td colspan="2" rowspan="2">Course type:</td><td colspan="2" rowspan="2">Discipline Specific Course</td><td colspan="2" rowspan="2">Total Credit:</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
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<tr><td>3 X 15 = 45</td><td>15X2=30</td><td>25</td><td>25</td><td>50</td><td>00</td><td colspan="2"></td></tr>
</table>

**Pre-requisite:** The students must have core subjects like Biology and Chemistry in their higher secondary level

**Rationale:** The course would provide an insight to the learner about the existence of different life forms on the Earth, and appreciate the diversity of animal life. It will help the student to understand the features of Kingdom Animalia and systematic organization of the animals based on their evolutionary relationships, structural and functional affinities

**Course Objective:** The course will also make the students aware about the characteristic morphological and anatomical features of diverse animals; economic, ecological and medical significance of various animals in human life; and will create interest among them to explore the animal diversity in nature.

**Course outcome:**

1. Learn about the importance of systematic, taxonomy and structural organization of animals.
2. Appreciate the diversity of non-chordates living in varied habit and habitats.
3. Understand evolutionary history and relationships of different non-chordates through functional and structural affinities.
4. Critically analysis the organization, complexity and characteristic features of no chordates making them familiarize with the morphology and anatomy of representatives of various animal phyla.

5. Comprehend the economic importance of non-chordates, their interaction with the environment and role in the ecosystem.

| Unit | Topic | Content | Hours | Weightage |
|---|---|---|---|---|
| 1 | | **Unit 1 Protista** | 15 | 33% |
| | 1.1 | Grades of body organization: level of organization, body symmetry, formation of germ layers, formation of coelom, body segmentation. | | |
| | 1.2 | General characteristics and classification of protozoa (up to class). | | |
| | 1.3 | Type study: Paramecium, Amoeba (habit and habitat, body structure, locomotion, nutrition, respiration, excretion and reproduction). | | |
| | 1.4 | Life cycle of Plasmodium. | | |
| 2 | | **Unit 2 Porifera & Cnidaria** | 15 | 33% |
| | 2.1 | General characteristics and classification of phylum porifera (up to class). | | |
| | 2.2 | Canal system and types of spicules in sponges. | | |
| | 2.3 | General characteristics and classification of phylum cnidaria (up to class) | | |
| | 2.4 | Type study: Hydra (habit and habitat, external and internal structure, digestive system, respiration, excretion, nervous system, reproduction and regeneration | | |
| 3 | | **Unit 3 Platyhelminths & Nematoda** | 15 | 34% |
| | 3.1 | General characteristics and classification of phylum platyhelminths (up to class). | | |
| | 3.2 | Type study: Fasciola (habit and habitat, structure, digestive system, respiration, excretion, nervous system, reproduction). | | |
| | 3.3 | General characteristics and classification of phylum nematode (up to class). Platyhelminthes and nematode related diseases: infestation, symptoms and treatment | | |
| | 3.4 | Type study: Ascaris (habit and habitat, structure, digestive system, respiration, excretion, nervous system, reproduction). | | |

## LIST OF EXPERIMENTS

1) Study of classification of protozoans (up to class) using (Amoeba, Euglena, Paramecium, Plasmodium).
2) Study of classification of phylum porifera (up to class) using laboratory specimens, models, slides, charts (Sycon or Leucosolenia, Hylonema or Euplectella, Spongilla or Euspongia).

3) Study of classification of phylum cnidaria (up to class) using laboratory specimens, models, slides, charts (Physalia or Hydra, Aurelia, Coral).
4) Study of classification of phylum Platyhelminthes (up to class) using laboratory specimens, models, slides, charts (Polystomum, Tap worm).
5) Study of classification of phylum Platyhelminthes (up to class) using laboratory specimens, models, slides, charts (Planaria, Liver fluke).
6) Study of classification of phylum nematode (up to class) using laboratory specimens, models, slides, charts (Filaria worm).
7) Study of classification of phylum nematode (up to class) using laboratory specimens, models, slides, charts (Ascaris).
8) Study of external morphology of Paramecium and preparation of whole mount slide of Paramecium from culture.
9) Examination of pond water collected from different places for diversity in Protista.
10) Study of adult Fasciola hepatica, Taenia solium, Ascaris lumbricoides and its life stages (Slides/micro-photographs).
11) Study of different body systems of Hydra using models, slides and charts.
12) Study of different body systems of Fasciola using models, slide and charts.
13) Study of different Body systems of Ascaris using models, slide and charts
14) Study of human parasitic diseases related to protozoan, platyhelminths and nematode (Malaria, Schistosomiasis, Lymphatic filariasis (Elephantiasis).
15) Field trip and report preparation.

## Suggested Readings:

1) Hickman C. P., et al. (2006) Integrated principals of Zoology, McGraw Hil Higher Education. 931pp. 14th edition.
2) Pechnik J. A. (2015) Biology of the Invertebrates, McGraw Hill Higher Education. 555 pp. 7th edition.
3) Jordan E. L. and Verma P. S. (1993) Invertebrate Zoology, S. Chand publishing. New Delhi.

4) EkambaranathaAyyar, M. and T.N. Ananthakrishnan, (1992) Manual of Zoology Vol. 1 (Invertebrates), parts I and II.S. Viswanathan (Printers and Publishers) Pvt. Ltd; Madras.2.

**CO-PO & CO-PSO Mapping**

| Course Outcomes | Program Outcomes/ Program Specific Outcomes (1-Less Relevant, 2- Mild Relevant, 3-Highly Relevant) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | **3** | **2** | **1** | **-** | **-** | **-** | **-** | **1** | **-** | **2** | **1** |
| CO2 | **3** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **-** | **2** | **-** |
| CO3 | **3** | **1** | **-** | **1** | **-** | **-** | **-** | **-** | **-** | **2** | **-** |
| CO4 | **3** | **2** | **-** | **-** | **-** | **-** | **-** | **-** | **1** | **1** | **1** |

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<tr><th colspan="8">NON-CHORDATES II: COELOMATES</th></tr>
<tr><td colspan="2" rowspan="2">Course type:</td><td colspan="2" rowspan="2">Discipline Specific Course</td><td colspan="2" rowspan="2">Total Credit:</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
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**Pre-requisite:** The students must have core subjects like Biology and Chemistry in their Higher secondary level

**Rationale:** The course would provide an insight to the learner about the existence of different life forms on the Earth, and appreciate the diversity of animal life. It will help the student to understand the features of Kingdom Animalia and systematic organization of the animals based on their evolutionary relationships, structural and functional affinities

**Course Objective:** The course will also make the students aware about the characteristic morphological and anatomical features of diverse animals; economic, ecological and medical significance of various animals in human life; and will create interest among them to explore the animal diversity in nature.

**Course outcome:**

1. Learn about the importance of systematics, taxonomy and structural organization of animals.
2. Appreciate the diversity of non-chordates living in varied habit and habitats.
3. Understand evolutionary history and relationships of different non-chordates through functional and structural affinities.
4. Critically analysis the organization, complexity and characteristic features of nonchordates making them familiarize with the morphology and anatomy of representatives of various animal Mollusca

5. Comprehend the economic importance of non-chordates, their interaction with the environment and role in the ecosystem.

| Unit | Topic | Content | Hours | Weightage |
|---|---|---|---|---|
| 1 | | **Unit 1 Mollusca** | 15 | 33% |
| | 1.1 | General characteristics and classification of phylum Mollusca (up to class). | | |
| | 1.2 | Type study: Pila (habit and habitat, external features, digestive system, respiratory system, blood vascular system, excretory system, nervous and sensory system and reproductive system) | | |
| | 1.3 | Torsion in gastropods. | | |
| | 1.4 | Pearl culture. | | |
| 2 | | **Unit 2 Annelida** | 15 | 33% |
| | 2.1 | General characteristics and classification of phylum Annelida (up to class). | | |
| | 2.2 | Metamerism in Annelida. | | |
| | 2.3 | Type study: Leech (habit and habitat, external features, digestive system, respiratory system, excretory system, nervous system and reproductive system). | | |
| | 2.4 | Economic importance of annelids. | | |
| 3 | | **Unit 3 Arthropoda** | 15 | 34% |
| | 3.1 | General characteristics and classification of phylum Arthropoda (up to class). | | |
| | 3.2 | Type study: Cockroach (habit and habitat, external features, body wall, endoskeleton, locomotion, digestive system, respiratory system, blood vascular system, excretory system, nervous and sensory system and reproductive system). | | |
| | 3.3 | Metamorphosis in insects. | | |
| | 3.4 | Useful and harmful insects. | | |

# LIST OF EXPERIMENTS

1) Study of classification of phylum Mollusca (up to class) using laboratory specimens, models, slides, charts (Mitilus, Octopus).
2) Study of classification of phylum Mollusca (up to class) using laboratory specimens, models, slides, charts (Chiton, Dentalium)
3) Study of classification of phylum Annelida (up to class) using laboratory specimens, models, slides, charts (Earthworm, Nereis, Leech).
4) Study of classification of phylum Arthropoda (up to class) using laboratory specimens, models, slides, charts (Spider, Centipede, Cockroach).

5) Study of classification of phylum Arthropoda (up to class) using laboratory specimens, models, slides, charts (Periapts, Limulus, Prawn)
6) Study of anatomy of different systems of Pila using charts and models (Digestive system, Nervous system and Reproductive system).
7) Study of anatomy of different systems of leech using charts and models (Digestive system, Nervous system and Reproductive system).
8) Study of anatomy of different systems of cockroach using charts and models (Digestive system, Nervous system and Reproductive system).
9) Study of histological structure of pharynx and gizzard using permanent slides.
10) Study of histological structure of typhlosole and ovary of earthworm using permanent slides.
11) Study of mouth parts of Leech.
12) Mounting of mouth parts of housefly, honey bee and mosquito.
13) Study of respiratory spiracles of cockroach
14) Study of radula of pila.
15) Field trip and report preparation

## Suggested Readings:

1) Hickman C. P., et al. (2006) Integrated principals of Zoology, McGraw Hill Higher Education. 931pp. 14th edition.
2) Pechnik J. A. (2015) Biology of the Invertebrates, McGraw Hill Higher Education. 555 pp. 7th edition.
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4) EkambaranathaAyyar, M. and T.N. Ananthakrishnan, (1992) Manual of Zoology Vol. 1 (In vertebrata), parts I and II.S. Viswanathan (Printers and Publishers) Pvt. Ltd; Madras. 2.

### CO-PO & CO-PSO Mapping

| Course Outcomes | Program Outcomes/ Program Specific Outcomes (1-Less Relevant, 2- Mild Relevant, 3-Highly Relevant) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | **2** | **2** | **-** | **-** | **-** | **2** | **-** | **1** | **2** | **2** | **1** |
| CO2 | **3** | **1** | **-** | **-** | **-** | **2** | **-** | **2** | **2** | **2** | **-** |
| CO3 | **2** | **2** | **-** | **-** | **-** | **2** | **-** | **2** | **-** | **2** | **1** |
| CO4 | **2** | **1** | **2** | **-** | **-** | **1** | **2** | **2** | **1** | **1** | **-** |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Programme Code** | | **DPZOO** | | **Programme Name** | Diploma Programme of Zoology Science | | |
| **Course Code** | | DPZOO301DSC | | **Semester** | III | | |
| **PRINCIPLES OF ECOLOGY** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | **Theory** | **Practical** | **Total** |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite:**The students must have Passed first year of B.Sc. zoology

**Rationale:** Ecological concepts are general understandings (or facts) about ecosystems and ecosystem management. Ecological principles are basic assumptions (or beliefs) about ecosystems and how they function that are informed by the ecological concepts.

**Course Objective:**

1. Understand ecological principles and their historical context.
2. Explore the impact of environmental factors such as light, temperature and interspecific interactions on organisms.
3. Gain insights into ecosystem structure, function, and biogeochemical cycles.
4. Develop a comprehensive knowledge of diverse aquatic and terrestrial ecosystems and their biotic communities.

**Course Outcome:** At the end of the course, students shall be able to

| | |
|---|---|
| CO1 | After thorough learning of this course student will understand the population and community characteristics ecosystem development and climax theories. |
| CO2 | Knowledge about the type of ecosystem food chains food web energy modals and ecological efficiencies. |
| CO3 | They will understand about the paramount role and importance of nature. |
| CO4 | It will impact then with the knowledge about the judicious use of existing ecological recourse for sustainable development. |

| Unit | Topic | Content | Hours | Weightage |
|---|---|---|---|---|
| 1 | | **Unit 1** | 15 | 33% |
| | 1.1 | Introduction to ecology, historical background, branches of ecology. | | |
| | 1.2 | Structure of atmosphere, lithosphere and hydrosphere | | |
| | 1.3 | Light and radiation: light variation in different environments, light receptors in organisms, effect of light on plants and animals. | | |
| | 1.4 | Temperature: temperature fluctuations in different environments, effect of temperature on plant and animals, thermal adaptations of plants and animals | | |
| 2 | | **Unit 2** | 15 | 33% |
| | 2.1 | Interspecific interactions: positive interactions- mutualism, commensalism, protocooperation; negative interaction- exploitation, mentalism, competition | | |
| | 2.2 | Kinds of ecosystems, structure of ecosystem, abiotic and biotic components of Ecosystem | | |
| | 2.3 | Functions of ecosystem- productivity of ecosystem, types of food chain, types of ecological pyramids, energy flow in ecosystem. | | |
| | 2.4 | Biogeochemical cycles: types of biogeochemical cycles, water cycle, oxygen cycle, carbon cycle, nitrogen cycle, sulphur and phosphorous cycle | | |
| 3 | | **Unit 3** | 15 | 34% |
| | 3.1 | Aquatic ecosystems: sub division of aquatic ecosystems, freshwater ecosystems, lentic and lotic ecosystems. | | |
| | 3.2 | Zonation of marine environment, stratification of marine environment, biotic communities of marine environment. | | |
| | 3.3 | Classification of terrestrial ecosystem: different types of biomes. | | |
| | 3.4 | Zoogeography. | | |

# LIST OF EXPERIMENTS

1) Principle and function of Sechi disc, Atmometer, Anemometer, Hygrometer, Hair hygrometer, Lux
   meter, Rain gauge, Soil thermometer and thermometer.
2) To determine pH, EC, Acidity, Total hardness, calcium hardness, Dissolve oxygen content of given water sample.
3) To determine soli texture, bulk density and particle density of given soil sample.
4) To determine water holding capacity and percolation rate of soil.

5) To determine pH, Chloride, Sulphate and Total Nitrogen, organic matter of given soil sample.
6) Study of effect of temperature and light, thermal adaptations on plant and animals using models or charts.
7) Study of mutualism, commensalism and protocooperation, negative interaction- exploitation, mentalism, competition with example using models or charts.
8) Study of negative interaction- exploitation, mentalism, competition with example using models or charts.
9) Study of abiotic and biotic components, types of food chain, types of ecological pyramids in ecosystem, energy flow of ecosystem using models, or charts.
10) Study of different types of biological cycles, zonation, stratification and biotic communities of marine environment, biomes, zoogeography using models or charts.

## Suggested Readings:

5) Hickman C. P., et al. (2006) Integrated principals of Zoology, McGraw Hill Higher Education. 931pp. 14th edition.
6) Pechnik J. A. (2015) Biology of the Invertebrates, McGraw Hill Higher Education. 555 pp. 7th edition.
7) Jordan E. L. and Verma P. S. (1993) Invertebrate Zoology, S. Chand publishing. New Delhi.
8) EkambaranathaAyyar, M. and T.N. Ananthakrishnan, (1992) Manual of Zoology Vol. 1 (In vertebrata), parts I and II.S. Viswanathan (Printers and Publishers) Pvt. Ltd; Madras. 2.

**CO-PO & CO-PSO Mapping**

| Course Outcomes | Program Outcomes/ Program Specific Outcomes (1-Less Relevant, 2- Mild Relevant, 3-Highly Relevant) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | **2** | **2** | **-** | **-** | **-** | **2** | **2** | **2** | **1** | **2** | **1** |
| CO2 | **2** | **2** | **-** | **-** | **-** | **1** | **-** | **2** | **2** | **2** | **1** |
| CO3 | **1** | **2** | **-** | **-** | **-** | **2** | **-** | **2** | **-** | **2** | **2** |
| CO4 | **2** | **1** | **2** | **-** | **-** | **1** | **2** | **2** | **-** | **-** | **1** |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Programme Code** | | **DPZOO** | | **Programme Name** | Diploma Programme of Zoology Science | | |
| **Course Code** | | DPZOO302DSC | | **Semester** | III | | |
| **CHORDATES- I** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | **Theory** | **Practical** | **Total** |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite:**The students must have Passed first year of B.Sc. zoology

**Rationale:** The phylum Chordata consists of animals with a flexible rod supporting their dorsal or back sides. The phylum name derives from the Greek root word chord- meaning string. Most species within the phylum Chordata are vertebrates, or animals with backbones (subphylum Vertebrata).

**Course Objective:**

1. To provide a comprehensive understanding of chordates and vertebrates, their classification, and unique characteristics.
2. To explore the origins and evolutionary significance of primitive chordate groups.
3. To examine the diverse adaptations and biological features of fishes and amphibians, including migration, parental care, and metamorphosis.
4. To facilitate practical knowledge through type studies of representative species, enhancing comprehension of their anatomy, physiology, and ecological roles.

**Course Outcomes:** At the end of the course, students shall be able to

| | |
|---|---|
| CO1 | Understand the evolution history and relationship between the different classes of chordates. |
| CO2 | Know the different characteristic along with their habit's habitats and distribution of the chordates. |
| CO3 | Understand the significance of the difference in physiological system between the vertebrates. |
| CO4 | Distinguish the significance of chordates from other lower organism and comprehend |

| | |
|---|---|
| | their advantages. |

| Unit | Topic | Content | Hours | Weightage |
|---|---|---|---|---|
| 1 | | **Unit 1** | **15** | **33%** |
| | **1.1** | General characters and origin of chordates. | | |
| | **1.2** | Outline classification of chordates | | |
| | **1.3** | Classification and general characters of subphylum Urochordata and Cephalochordate | | |
| | **1.4** | Type study: Herdmania(Urochordata)and Amphioxus (Cephalochordate) (habit and habitat, external features and systems) | | |
| 2 | | **Unit 2** | **15** | **33%** |
| | **2.1** | General characteristics and classification of subphylum vertebrata | | |
| | **2.2** | General characters and classification of fishes (up to orders), differences between Chondrichthyes and Osteichthyes, types of scales and caudal fins | | |
| | **2.3** | Migration and parental care in fishes | | |
| | **2.4** | Type study: *Scoliodon*- dog fish (habit and habitat, external features, digestive system, respiration | | |
| 3 | | **Unit 3** | **15** | **34%** |
| | **3.1** | General characteristics and classification of class amphibia | | |
| | **3.2** | Metamorphosis in frog | | |
| | **3.3** | Parental care in amphibia | | |
| | **3.4** | Type study: *Hoplobatrachustigrinus*- bull frog (habit and habitat, external features, digestive system, respiration, blood vascular, nervous and Urinogenital system) | | |

# LIST OF EXPERIMENTS

1) Study of classification of subphylum Urochordata and cephalochordate (up to Order) using laboratory specimens, models, slides, charts.
2) Study of classification of fishes (up to Order) using laboratory specimens, models, slides, charts.
3) Study of classification of Amphibian up to orders using laboratory specimens, models, slides, charts.

4) Study of Digestive system,Arterial system, venous system, Nervous system, Urinogenital system ofScoliodon using models, slides and charts.
5) Study of Digestive system,Arterial system, venous system, Nervous system, Urinogenital system of Bull frog using models, slides and charts.
6) Study of Embryology of Amphioxus using models, slides and charts.
7) Study of Migration, Parental care, in fishes.
8) Study of Metamorphosis in frog.
9) Study of Parental care in amphibian.
10) Study of Ampullae of Lorenzen, scale and internal ear of Dog fish using models, slides and charts (Mounting).
11) Study of buccal cavity, eye and Ear of Bull frog using models, slides and charts (Mounting).

## Suggested Readings:

9) Hickman C. P., et al. (2006) Integrated principals of Zoology, McGraw Hill Higher Education. 931pp. 14th edition.
10) Pechnik J. A. (2015) Biology of the Invertebrates, McGraw Hill Higher Education. 555 pp. 7th edition.
11) Jordan E. L. and Verma P. S. (1993) Invertebrate Zoology, S. Chand publishing. New Delhi.
12) EkambaranathaAyyar, M. and T.N. Ananthakrishnan, (1992) Manual of Zoology Vol. 1 (In vertebrata), parts I and II.S. Viswanathan (Printers and Publishers) Pvt. Ltd; Madras. 2.

### CO-PO & CO-PSO Mapping

| Course Outcomes | Program Outcomes/ Program Specific Outcomes (1-Less Relevant, 2- Mild Relevant, 3-Highly Relevant) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | **2** | **3** | **-** | **-** | **-** | **2** | **2** | **2** | **-** | **2** | **1** |
| CO2 | **2** | **2** | **-** | **-** | **-** | **2** | **-** | **1** | **2** | **1** | **-** |
| CO3 | **2** | **2** | **-** | **-** | **-** | **1** | **-** | **2** | **-** | **2** | **-** |
| CO4 | **2** | **1** | **2** | **-** | **-** | **1** | **2** | **2** | **1** | **1** | **1** |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Code** | | **DPZOO** | | **Programme Name** | Diploma Programme of Zoology Science | |
| **Course Code** | | DPZOO401DSC | | **Semester** | IV | |
| **COMPARATIVE ANATOMY OF VERTEBRATES** | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | **Theory** | **Practical** | **Total** |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite:**The students must have Passed first year of B.Sc. zoology

**Rationale:** Comparative Anatomy, The Comparative Study of The Body Structures of Different Species of Animals in Order to Understand the Adaptive Changes They Have Undergone in The Course of Evolution from Common Ancestors.

**Course Objective:**

1. To impart students with a comprehensive understanding of vertebrate morphology, encompassing the integumentary system, digestive and respiratory organs, skeletal structures, receptors, and nervous systems.
2. To facilitate comparative analysis across vertebrate groups, enabling students to recognize anatomical variations and adaptations.
3. To equip students with the knowledge and skills necessary for careers in biology, zoology, and veterinary sciences by fostering a deep appreciation for vertebrate structure and function.
4. To prepare individuals to contribute to research and education in the field of vertebrate morphology, promoting a deeper understanding of the animal kingdom's diversity and evolution.

**Course Outcome:** At the end of the course, students shall be able to

| | |
|---|---|
| CO1 | To impart students with a comprehensive understanding of vertebrate morphology, encompassing the integumentary system |
| CO2 | To facilitate comparative analysis across vertebrate groups, enabling students to recognize |

| | |
|---|---|
| | anatomical variations and adaptations. |
| CO3 | To equip students with the knowledge and skills necessary for careers in biology, zoology, and veterinary sciences by fostering a deep appreciation for vertebrate structure and function. |
| CO4 | To impart students with a comprehensive understanding of vertebrate digestive and respiratory organs, skeletal structures, receptors, and nervous systems |

**Content**

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | Vertebrate morphology: definition, scope and importance<br>Development, structure and functions of vertebrate integument and its derivatives (glands, scales, feathers and hair)<br>Comparative account of digestive organs of different vertebrate groups<br>Comparative account of respiratory organs of different vertebrate groups | 1 | 33 % |
| II | Overview of f axial and appendicular skeleton of vertebrates<br>Comparative account of skeletal system of different vertebrate groups (skull, pectoral and pelvic girdles, vertebral column, teeth and jaw suspensorium)<br>Classification of receptors, Brief account of olfactory and auditory receptors in vertebrate<br>Comparative account of urinogenital system in vertebrates | 1 | 33 % |
| III | Comparative account of heart in vertebrates<br>Comparative account of aortic arches and portal systems of vibrates.<br>Comparative account of brain and spinal cord of vertebrates<br>Comparative account of peripheral and autonomous nervous system. | 1 | 34 % |

**Reference Books:**

1) Hickman C. P., et al. (2006) Integrated principals of Zoology, McGraw Hill Higher Education. 931pp. 14th edition.
2) Kotpal R. L. (2010) vertebrates, Rastogi Publications, 882 pp
3) Jordan E. L. and Verma P. S. (2013) Chordate Zoology, S. Chand publishing. New Delhi.

**Online Resources:**

1. http://gdckulgam.edu.in/Files/f07ef270-7e91-4716-8825-2966f17cc0f7/Custom/Comparative%20Anatomy%20and%20Developmental%20Biology%20of%20Vertebrates_compressed.pdf
2. https://content.patnawomenscollege.in/zoology/COMPARITIVE%20ANATOMY%20OF%20DIGESTIVE%20SYSTEM%20IN%20VERTEBRATES.pdf
3. https://opentextbc.ca/biology/chapter/19-1-types-of-skeletal-systems/
4. http://www.citycollegekolkata.org/online_course_materials/Comparative_Anatomy_of_Aortic_Arches_in_Vertebrates.pdf
5. http://www.citycollegekolkata.org/online_course_materials/20201203_Comparative_Anatomy_of_Heart_in_Vertebrates.pdf

**Practical:**

1. Study of vertebrate integument and its derivatives glands
2. Study of vertebrate integument and its derivativesscalesfeathers
3. Study of vertebrate integument and its derivativeshair
4. Comparative account of digestive organs (Stomach), different vertebrate groups.
5. Comparative account ofrespiratory organsdifferent vertebrate groups.
6. Comparative account ofLung and tracheadifferent vertebrate groups.
7. Comparative account ofSkull different vertebrate groups.
8. Comparative account of pectoral girdlesof different vertebrate groups.
9. Comparative account of vertebral columnof different vertebrate groups.
10. Comparative account ofteeth and Jaw of different vertebrate groups.
11. Study of Comparative account of receptors, auditory receptors in vertebrate animals.
12. Study of Comparative account of kidney,brain in vertebrate animals.
13. Study of Comparative account ofheart, aorticarches, portalin vertebrate animals.
14. Study of Comparative account of brain, spinal cord, peripheral nervous system, autonomous nervous system of vertebrates.

**CO-PO & CO-PSO Mapping**

| **Course Outcomes** | **Program Outcomes/ Program Specific Outcomes (1-Less Relevant, 2- Mild Relevant, 3-Highly Relevant)** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | **2** | **1** | **-** | **-** | **-** | **2** | **-** | **2** | **2** | **2** | **-** |
| CO2 | **2** | **2** | **-** | **-** | **-** | **2** | **-** | **2** | **2** | **1** | **1** |
| CO3 | **2** | **2** | **-** | **-** | **-** | **2** | **-** | **-** | **1** | **2** | **-** |
| CO4 | **1** | **1** | **2** | **-** | **-** | **1** | **-** | **1** | **1** | **1** | **1** |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Code** | | **DPZOO** | | **Programme Name** | Diploma Programme of Zoology Science | |
| **Course Code** | | DPZOO402DSC | | **Semester** | IV | |
| CHORDATES- II | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | **Theory** | **Practical** | **Total** |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite:**The students must have Passed first year of B.Sc. zoology

**Rationale:** The notochord is an embryonic midline structure common to all members of the phylum Chordata, providing both mechanical and signaling cues to the developing embryo. In vertebrates, the notochord arises from the dorsal organizer and it is critical for proper vertebrate development.

**Course Objective:**

1. To provide students with a comprehensive understanding of vertebrate biology by exploring the classification, anatomy, and adaptations of reptiles, birds, and mammals.
2. To facilitate in-depth type studies of representative species, fostering analytical skills and knowledge of vertebrate anatomy and physiology.
3. To equip students with the expertise needed to appreciate the ecological roles, adaptations, and economic significance of these vertebrate classes, preparing them for careers in biology and conservation.
4. To inspire a deep appreciation for biodiversity and evolution in the natural world, motivating students to contribute to research, education, and conservation efforts in vertebrate biology.

**Course Outcomes:** At the end of the course, students shall be able to

| | |
|---|---|
| CO1 | Understand the evolutionary history and relationship between the different classes of chordates. |

| | |
|---|---|
| CO2 | Know the different characteristics along with their habits and distribution of the chordates. |
| CO3 | Understand the significance of the different in physiological systems between the vertebrates. |
| CO4 | Distinguish the significance of the chordates from other lower organisms and comprehend their advantages |

**Content**

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | General characters and classification of class Reptilia<br>Origin, evolution and adaptive radiation in reptiles.<br>Type study: *Calottes versicolor*- The Garden Lizard (habit and habitat, external features, digestive system, respiration, blood vascular, nervous and Urinogenital system)<br>Introduction to venomous and non- venomous snakes, poison apparatus and biting mechanism in snakes, symptoms and cure of snake bite | 1 | 33 % |
| II | General characteristics and classification of class Aves<br>Type study: *Columba livia*- The common rock pigeon (habit and habitat, external features, digestive system, respiration, blood vascular, nervous and Urinogenital system)<br>Origin, mechanism, mode and adaptation of bird flight<br>Migration and economic importance of birds | 1 | 33 % |
| III | General characteristics and classification of class Mammalia<br>Type study: *Rattus rattus*- The Rat (habit and habitat, external features, digestive system, respiration, blood vascular, nervous and Urinogenital system)<br>Adaptations in terrestrial, aquatic and flying mammals<br>Economic importance of mammals | 1 | 34 % |

**Reference Books:**

1) Hickman C. P., et al. (2006) Integrated principals of Zoology, McGraw Hill Higher Education. 931pp. 14th edition.
2) Kotpal R. L. (2010) vertebrates, Rastogi Publications, 882 pp
3) Jordan E. L. and Verma P. S. (2013) Chordate Zoology, S. Chand publishing. New Delhi.

**Online Resources:**

1. https://www.notesonzoology.com/vertebrates/reptiles/reptiles-origin-and-adaptive-radiation-with-diagram-chordata-zoology/8230
2. https://www.biologydiscussion.com/zoology/reptiles/calotes-structure-sense-organs-and-ecdysis-reptiles/41163
3. https://ugcmoocs.inflibnet.ac.in/assets/uploads/1/225/6922/et/20_Academic%20Script20031907070303484 8.pdf

**Practical:**

1. Study of classification of Class Reptilia (up to Order) using laboratory specimens, models, slides, charts.
2. Study of classification of class Aves (up to Order) using laboratory specimens, models, slides, charts.
3. Study of classification of class Mammalian up to orders using laboratory specimens, models, slides, charts.
4. Study of Digestive system, Arterial system, venous system,Nervous system, Urinogenital systemof*Calotis versicolor* using models, slides and charts.
5. Study of Digestive system, Arterial system, venous system,Nervoussystem,Urinogenital system, of *Columba Livia*using models, slides and charts.
6. Study of Digestive system, Arterial system,venous system, Nervous system, Urinogenital system, of*Rattusrattus*using models, slides and charts.
7. Study of Air sac and gizzard of *Columba Livia*using models, slides and charts (mounting).
8. Study of Pectin and cloacae of *Calotis versicolor* using models, slides and charts (mounting).
9. Study of hair and teeth of *Rattus rattus*using models, slides and charts (mounting). \
10. Study of Adaptations in terrestrial, aquatic, flyingmammals.
11. Study of venomous snakes and non- venomous snakes using models, biting mechanism in snakes using models, slides and charts.

**CO-PO & CO-PSO Mapping**

| **Course Outcomes** | **Program Outcomes/ Program Specific Outcomes (1-Less Relevant, 2- Mild Relevant, 3-Highly Relevant)** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | **2** | **3** | **-** | **-** | **-** | **2** | **2** | **2** | **2** | **2** | **-** |
| CO2 | **1** | **1** | **-** | **-** | **-** | **2** | **-** | **2** | **2** | **3** | **-** |
| CO3 | **2** | **2** | **-** | **-** | **-** | **2** | **-** | **1** | **1** | **2** | **1** |
| CO4 | **2** | **1** | **-** | **-** | **-** | **1** | **2** | **2** | **2** | **1** | **1** |

GOKUL GLOBAL UNIVERSITY

Approved By Govt. of Gujarat
(Recognized by UGC under Section 22 & 2(f) of 1956)
(Gujarat Private State University Act 4 of 2018)

# COURSE STRUCTURE

## Bachelor of Science

## Mathematics

# Under

## National Education Policy (NEP-2020)


Faculty of Science
Gokul Science College
University Campus, State Highway-41,
**Siddhpur** - 384151, **Dist.** Patan, Gujarat, INDIA, **Mobile :** 9510973863
**E- Mail :** dean.fac.sci@gokuluniversity.ac.in, **Website :** www.gokuluniversity.ac.in

**Program Outcomes:** At the end of the Program, students shall be able to

| PO No. | Program Outcome Description |
|---|---|
| PO1 | Foundational Knowledge: Graduates will possess a strong foundation in the fundamental concepts, theories, and principles of their chosen discipline, as per the prescribed curriculum. |
| PO2 | Practical Skills: Students will acquire practical skills relevant to their field, including laboratory techniques, data collection, analysis, and interpretation. |
| PO3 | Critical Thinking: Graduates will develop critical thinking skills to analyze, evaluate, and solve scientific problems, applying logical reasoning and evidence-based approaches. |
| PO4 | Effective Communication: Students will demonstrate effective communication skills, both orally and in writing, to convey scientific ideas and findings to different audiences. |
| PO5 | Collaboration and Teamwork: Graduates will work collaboratively in teams, engaging in effective communication, cooperation, and coordination to accomplish shared objectives. |
| PO6 | Information Literacy: Students will develop information literacy skills to access, evaluate, and utilize scientific information from diverse sources, including digital resources. |
| PO7 | Ethical Awareness: Graduates will demonstrate ethical awareness and responsibility in scientific practice, understanding the importance of integrity, honesty, and ethical conduct. |
| PO8 | Lifelong Learning: Students will develop a commitment to lifelong learning, staying updated with advancements in their field and engaging in continuous professional development. |
| PO9 | Societal Impact: Graduates will recognize the social and ethical implications of scientific knowledge and contribute positively to society through their discipline. |

## Program specific outcome

| PSO No. | Program Specific Outcome Description |
|---|---|
| PSO1 | Mathematical Proficiency: Graduates of the B.Sc. Mathematics program will possess a strong foundation in mathematical concepts, theories, and techniques. They will demonstrate proficiency in mathematical reasoning, problem-solving, and the application of mathematical tools and methods in various domains. |
| PSO2 | Analytical Thinking and Modeling: Graduates will develop advanced analytical thinking skills and the ability to construct mathematical models to represent and solve real-world problems. They will apply mathematical principles to analyze data, make predictions, and provide insights in fields such as finance, engineering, and computer science. |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF MATHEMATICS**
**B.Sc. Semester I (Course Structure)**
(IN EFFECT FROM ACADEMIC YEAR: 2023-24)

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Certificate | UG | I | Discipline Specific Course (Major-1) | CPMAT101DSC | Differential Calculus | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | CPPHY101DSC | Mechanics and Basic Electronics (MAE) | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Minor) | CPCHE101DSC | General Chemistry-I | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi-Disciplinary Course | CP101MDC | Basics of computer application | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | CP101AEC | Communication Skills-1 | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Indian Knowledge System | CP101IKS | Indian Constitution | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | CP101SE | Photography Basics | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF MATHEMATICS**
**B.Sc. Semester II (Course Structure)**
(IN EFFECT FROM ACADEMIC YEAR: 2023-24)

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Certificate | UG | II | Discipline Specific Course (Major-1) | CPMAT201DSC | Integral Calculus & Differential Equation | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | CPPHY201DSC | Wave, Electronics & Semiconductor Device (WES) | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Minor) | CPCHE201DSC | General Chemistry-II | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi-Disciplinary Course | CP201MDC | Basic Statistics | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | CP201AEC | Communication Skills-2 | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Discipline Specific Course (Major-1) | CPMAT201DSC | Integral Calculus & Differential Equation | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Discipline Specific Course (Major-2) | CPPHY201DSC | Wave, Electronics & Semiconductor Device (WES) | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF MATHEMATICS**
**B.Sc. Semester III (Course Structure)**
(WITH EFFECT FROM AN ACADEMIC YEAR: 2024-25)

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Diploma | UG | III | Discipline Specific Course (Major-1) | DPMAT301DSC | Linear Algebra and Calculus | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | DPMAT302DSC | Numerical Analysis | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Major-3) | DPPHY301DSC | Optics, Modern Physics & Laser (OMPL) | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi-Disciplinary Course | DP301MDC | Artificial Intelligence (AI):- Knowledge Representation and Reasoning | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | DP301AEC | Creative Writing Essential | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Indian Knowledge System | DP301IKS | Yoga | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | DP301SEC | Presentation Skills | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF MATHEMATICS**
**B.Sc. Semester IV (Course Structure)**
(WITH EFFECT FROM AN ACADEMIC YEAR: 2024-25)

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Diploma | UG | IV | Discipline Specific Course (Major-1) | DPMAT401DSC | Advanced Calculus | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | DPMAT402DSC | Advanced Linear Algebra | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Major-3) | DPPHY401DSC | Electromagnetism, Electronics & Plasma Physics (EMEP) | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Discipline Specific Course (Minor) | DPMAT403DSC | Mathematical Modeling | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | DP401AEC | Personality Development | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Value Added Course-II | DP401VAC | Sports And Fitness | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | DP401SEC | Stress Management | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Code** | CPMAT | | **Programme Name** | Certificate Programme of Mathematics | | |
| **Course Code** | CPMAT101DSC | | **Semester** | I | | |
| **DIFFERENTIAL CALCULUS** | | | | | | |
| **Course type:** | Discipline Specific Course | | **Total Credit:** | Theory | Practical | Total |
| | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | | **Total** (Marks) |
| | | **Theory** | **Practical** | **Theory** | **Practical** | **100** |
| 3 X 15 = 45 | 15 X 2=30 | 25 | 25 | 50 | 00 | |

**Pre-requisite:** Having Passed 12th science examination from recognized board with A or AB Group**.**

**Rationale :** The primary objects of study in differential calculus are the derivative of a function, related notions such as the differential, and their applications.

**Course Objective:**

- Construct mathematical expressions and graphs involving functions and their derivatives.
- Compute mathematical quantities using differential calculus and interpret their meaning
- Write logical progressions of precise statements to justify and communicate mathematical reasoning

**Course Outcome:**

- The students will be solve differentiable equation, define power series and solve other equation of cone, sphere.
- Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bendiness of a curve.
- Solve first-order linear/nonlinear ordinary differential equations analytically using standard methods.

| Unit | Topic | Content | Hours | Weightage |
|---|---|---|---|---|
| 1 | | **Matrices & Vector analysis** | 15 | 33% |
| | 1.1 | Introduction of matrices, different types of matrices, Operations on matrices, theorems on matrices. Symmetric and skew -symmetric matrices, Hermitian and skew-Hermitian matrices | | |
| | 1.2 | Linear dependence and independence of row and column matrices, Row rank, Column rank and rank of matrix, Row reduced Echelon form of a matrix and matrix inversion using it | | |
| | 1.3 | Vector analysis: scalar and vector product of three vectors, Product of four vectors, Reciprocal vectors, vector differentiation | | |
| | 1.4 | Polar co-ordinates, Spherical and cylinder co-ordinates and their relations | | |
| 2 | | **Successive differentiation** | 15 | 33% |
| | 2.1 | Successive Derivatives, Some standard results for $n^{th}$ derivatives, | | |
| | 2.2 | Leibnitz's Theorem and its examples, Cauchy's Mean Value Theorem | | |
| | 2.3 | Taylor's Theorem (without proof), Maclaurin's series (without proof) and its examples, Expansion of power series of $\sin x$, $\cos x$, $e^x$ | | |
| 3 | | **Geometry** | 15 | 34% |
| | 3.1 | **Sphere, Cone and Cylinder and introduction to Conicoids:** Plane section of sphere, intersection of two sphere, intersection of sphere and line, power at a point, tangent plane and normal Plane of contact, angle of intersection of two Spheres, condition of orthogonality. | | |
| | 3.2 | **Cone:** Definition of cone, vertex, guiding curve, generators, equation of a cone with a given vertex and a guiding curve, right Circular cone with given vertex, axis and semi vertical angle | | |
| | 3.3 | **Cylinder:** Definition of a cylinder, equation of a cylinder whose generators intersect a given cone and are parallel to a given line equation of a right circular cylinder | | |

## Reference Books:


- Shantinarayan: Text book of Matrices, S. Chand and Co.
- Vector Analysis, by Murry R. Spiegel.
- Vector Analysis, by Dr. K. S. Rawat, SARUP& SONS, DELHI
- Gorakhprasad: Differential Calculus, Pothishala Pvt. Ltd., Allahabad

- Calculus by Dr. K.R.Kachot, Mahajan publishing house

## LIST OF EXPERIMENTS

1) Solution of simultaneous linear equations using matrices.
2) Application of the inverse matrix by row reduction method.
3) Application of the rank of a matrix and rank of a matrix
4) Application of the rank of a matrix by transforming into echelon form.
5) Application of Hermitian and skew – Hermitian matrices.
6) Application of gradient & divergent.
7) Application of curl.
8) Find the nth derivative of the given function at given point.
9) Application of Leibnitz's theorem.
10) Application of Cauchy Mean value theorem.
11) Application of Taylor's theorem
12) Application of Maclaurin's theorem.
13) Application on Sphere.
14) Application on Cone
15) Application on Cylinder

## Reference Books:


- James Stewart: "Calculus" Cengage publications, 7th edition, 4th Reprint 2019
- B. S. Grewal: "Higher Engineering Mathematics", Khanna publishers, 44th Ed.2018 E.
- Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed. (Reprint), 2016.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):**

| Course Outcomes | Program Outcomes<br>1: -Less relevant, 2:- Mild relevant 3:- Highly relevant | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 2 | 1 | 1 | | | | | 3 | 1 |
| CO2 | 3 | 3 | | | | | 1 | 1 | | 2 | 2 |
| CO3 | 2 | 1 | | 1 | | 1 | | 1 | | 2 | 1 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Code** | CPMAT | | **Programme Name** | Certificate Programme of Mathematics | | |
| **Course Code** | CPMAT201DSC | | **Semester** | II | | |
| **INTEGRAL CALCULUS & DIFFERENTIAL EQUATION** | | | | | | |
| **Course type:** | Discipline Specific Course | | **Total Credit:** | Theory | Practical | Total |
| | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | | **Total** (Marks) |
| | | **Theory** | **Practical** | **Theory** | **Practical** | **100** |
| 3 X 15 = 45 | 15 X 2=30 | 25 | 25 | 50 | 00 | |

**Pre-requisite** : Having Passed 12th science examination from recognized board with A or AB Group**.**

**Rationale** : integral calculus & differential equation we being a few examples to illustrate how some integration problems involving rational number.

**Course Objective:**

- Analyze functions using limits, derivative, and integrals.
- Calculate definite integrals that may in involve logarithms, exponentials, and polynomials.
- The applications of differential calculus and also organize results in appropriate visual displays or tables.

**Course Outcome:**

- Explain the relationship between the derivative of a function as a function and the notion of the derivative as the slope of the tangent line to a function at a point.
- Compare and contrast the ideas of continuity and differentiability.
- To inculcate to solve algebraic equations and inequalities involving the sequence root and modulus function.

| Unit | Topic | Content | Hours | Weightage |
|---|---|---|---|---|
| 1 | | **Integration:** | 15 | 33% |
| | 1.1 | **Reduction formula:** $\int_0^{\frac{\pi}{2}} sin^n\theta\, d\theta, \int_0^{\frac{\pi}{2}} cos^n\theta\, d\theta, \int_0^{\frac{\pi}{2}} sin^m\theta\, cos^n\theta\, d\theta,\ m,n \in N$ | | |
| | 1.2 | Application of definite integrals to: Summation of the series | | |
| | 1.3 | Application of definite integrals to: Rectification | | |
| | 1.4 | Application of definite integrals to: Surface and volume revolution | | |
| 2 | | **De Moivre's theorem and its applications:** | 15 | 34% |
| | 2.1 | Roots of a complex number | | |
| | 2.2 | Application of Expansion of $\sin^n\theta, \cos^n\theta, n \in N$ in terms of sine and cosine of multiples of $\theta$ | | |
| | 2.3 | Expansion of $\sin n\theta$, $\cos n\theta$ and $\tan n\theta$ in terms power of sine, cosine and tangent respectively | | |
| | 2.4 | Exponential, Circular and hyperbolic function, Logarithmic and Inverse functions. | | |
| 3 | | **Linear Differential Equation** | 15 | 33% |
| | 3.1 | Linear differential equation $\frac{dy}{dx} + Py = Q$, $P$ and $Q$ are functions of $x$, Bernoulli's differential equation, Differential equation of first order and higher degree solvable, For $x$, solvable for $y$, solvable for $P = \frac{dy}{dx}$. | | |
| | 3.2 | Solution of Clairaut's and Lagrange's differential equation. Linear differential equation with constant coefficients. | | |

## Reference Books:


- Shantinarayan: Integral Calculus, S. Chand and Co., New Delhi
- Gorakhprasad: Integral Calculus, Pothishala Pvt. Ltd., Allahabad.
- D.A. Murray: Differential Equations, Tata McGraw Hills
- Frank Ayres: Theory and problems on Differential Equations, McGraw Hill Book Co., New York.

## LIST OF EXPERIMENTS

16) Application of Reduction formula for integration.

17) Application of summation of the series.

18) Application of rectification by using integration.

19) Application of surface revolution using integration.

20) Application of volume revolution.

21) Application of De' Moivre's theorem.

22) Application of roots of complex number.

23) Application of $\sin n\theta, \cos n\theta$ , $n \in N$ in terms of $\sin^n\theta, \cos^n\theta$.

24) Application logarithm and Inverse Function.

25) Application of $\sin n\theta, \cos n\theta$ and $\tan n\theta$ in terms of power of $\sin\theta$, $\cos\theta$ and $\tan\theta$

26) Application of linear differential equation $dy/dx + Py = Q$, where $P$ and $Q$ are function of $x$.

27) Application of Bernoulli's differential equation.

28) Application of differential equation in first order and higher degree solvable for $x, y$ and $p$, Where $P = dy/dx$

29) Application of Clairaut's differential equation.

30) Application of linear differential equation with constant coefficients.

## Reference Books:


- James Stewart: "Calculus" Cengage publications, 7th edition, 4th Reprint 2019
- Integral Calculus Differential Equations, Dipak Chatterjee, Tata McGraw-Hill, 1999

**Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):**

| Course Outcomes | Program Outcomes<br>1:-Less relevant, 2:- Mild relevant 3:- Highly relevant | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 1 | 2 | | | | 1 | | 3 | 1 |
| CO2 | 2 | 3 | 2 | | 1 | | 1 | | | 2 | 2 |
| CO3 | 3 | 2 | | | | 1 | 1 | | | 2 | 1 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | |
|---|---|---|---|---|---|---|
| **Programme Code:** | CPMDC | | | **Programme Name:** | Certificate Programme of Multi-Disciplinary Course | |
| **Course Code:** | CP201MDC | | | **Semester:** | II | |
| **Basic Statistics** | | | | | | |
| **Course Type:** | Multi-Disciplinary Course | | | **Total Credit:** | Theory | Practical | Total |
| | | | | | 03 | 01 | 04 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | |
| **Theory** (hrs) | **Practical** (hrs) | **Internal** (Marks) | | **External** (Marks) | | **Total** (Marks) |
| 45=15 X 3 | 30=15 X 2 | Theory | Practical | Theory | Practical | 100 |
| | | 25 | 25 | 50 | 00 | |

**Course Objective:**

(a) The course aims to introduce the basic concepts of Probability and Statistics.
(b) The course aims to equip students with the ability to apply statistical methods to solve real-world problems across different domains.
(c) Another objective of the course is to develop students' analytical skills through hands-on experience with statistical analysis.
(d) **Course Outcomes:** At the end of the course, students shall be able to

| | |
|---|---|
| CO1 | Analyse statistical data using measures of central tendency and Dispersion. |
| CO2 | Understand Concepts of Correlation and basic concepts of Regression. |
| CO3 | Understand and use the terminology of probability |

| Unit | Content | Hrs. | Weightage |
|---|---|---|---|
| 1 | **Measures of central tendency:** Mean, mode and median, harmonic and geometric means.<br><br>**Measures of dispersion:** Range, coefficient of range, Quartiles deviations, standard deviation, mean deviation. | 15 | 33% |
| 2 | **Correlation & Regression analysis:** Definitions of correlation, positive & negative correlations, Scatter diagram, Karl- Pearson's coefficient of linear correlation, Properties of correlation coefficients and examples, regression coefficient, properties of regression coefficient and examples. | 15 | 33% |
| 3 | **Probability:** Classical- Statistical (or Empirical)- Axiomatic (Modern) definition of probability, Definitions of event, equally likely, mutually exclusive and exhaustive events, Probability theorems, Statements of Baye's theorem and examples, Conditional probability and examples. | 15 | 34% |

**Reference Books:**

1. "Comprehensive Statistical Method", P.N.Arora, Sumeet Arora, S. Arora.
2. "Fundamental of Applied Statistics", S.C. Gupta & V.K. Kapoor-COMDEX.
3. "Business Statistics", R.S. Bhardwaj, Excel Books, New Delhi.
4. "Statistical Methods", S. P. Gupta-Sultan Chand Publication
5. "Business Statistics", Bharat Jhunjhunwala, S. Chand Prakashan.
6. "Statistics", R.S.N.Pillai, V. Bagavathi, S. Chand & Company, New- Delhi.

**Suggested Readings:**

1. "Comprehensive Statistical Method", P.N.Arora, Sumeet Arora, S. Arora.

**Online Resources:**

1. https://youtu.be/lBB4stn3exM?si=YIy-oqVNSscYjyx5
2. https://youtu.be/V3iEsLPAD68?si=rGcD1cpznxuzQhgY
3. https://youtu.be/QAEZOhE13Wg?si=CKxDA2zeRlCRaDxr

**Practical / Activities:**

1. Introduction to MATLAB: Basic commands and syntax.
2. Using MATLAB as a calculator.
3. Creating and manipulating variables.
4. Data Input and Output: Importing data from external files (e.g., .txt, .csv).
5. Data Input and Output: Exporting data to external files.
6. Calculating mean, median, mode.
7. Calculating variance, standard deviation, range.
8. Generating histograms and frequency distributions.
9. Plotting different types of graphs (e.g., line plots, scatter plots, bar charts).
10. Customizing plot appearance (e.g., labels, titles, colors).
11. Creating subplots for multiple visualizations.
12. Statistical Functions in MATLAB: Utilizing built-in MATLAB functions for statistical analysis (e.g., mean(), std(), corr(), regress()).
13. Case Studies and Applications: Solving practical problems using statistical methods.
14. Calculating Pearson correlation coefficient.
15. Performing linear regression analysis: Visualizing scatter plots and regression lines.

**Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):**

| **Course Outcomes** | **Program Outcomes**<br>**1:-Less relevant, 2:- Mild relevant 3:- Highly relevant** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 2 | | 2 | | 1 | 1 | 1 | 3 | 2 |
| CO2 | 3 | 3 | | 1 | 1 | 1 | | | 1 | 2 | 2 |
| CO3 | 3 | 2 | 1 | 1 | | 1 | | 1 | | 2 | 1 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Programme Code** | DPMAT | | **Programme Name** | | Diploma Programme of Mathematics | | |
| **Course Code** | DPMAT301DSC | | **Semester** | | III | | |
| **Linear Algebra and Calculus** | | | | | | | |
| **Course Type** | Discipline Specific Course | | **Total Credit** | | Theory | Practical | Total |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | **Examination Marking scheme** | | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Practical** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15 X 2=30 | 25 | 25 | 50 | 00 | 75 | 25 | 100 |

**Prerequisite:** Basic knowledge of relation, equivalence relation, binary operation.

**Course Objective:**

(a) The main objective of this course is to learn vector space, linear transformations.
(b) learn some basics of partial derivatives and its applications.
(c) Compute mathematical quantities using differential calculus and interpret their meaning.

**Course Outcomes:** At the end of the course, students shall be able to

| | |
|---|---|
| CO1 | Learn the concept of vector spaces and linear transformations which are essential in simplifying various scientific problems. |
| CO2 | Apply problem-solving skills to effectively compute large linear systems. |
| CO3 | Apply vector calculus techniques to motivate the study of vector differentiation and integration in two- and three-dimensional spaces. |
| CO4 | Understand the combination of two important aspects of modern mathematics via Linear Algebra and Vector Calculus. |

| Unit | Content | Credit | Weightage |
|---|---|---|---|
| 1 | **Vector space:** Definition, Examples, and Properties of Vector space and Subspaces, Span of a Set, Operations of Subspaces, Sum and direct sum of Subspaces. Finite linear combination, Linear dependence/independence, Basis and dimension of a vector space, Dimension Theorem.<br><br>**Linear Transformations:** Linear Transformations, Range and Kernel of a Linear Map, Rank and Nullity of a Linear Map, Rank – Nullity Theorem, Inverse of a Linear Map, Consequences of Rank – Nullity Theorem, Isomorphism, Operator equation | 1 | 34% |
| 2 | **Limit-Continuity and Differentiability of function of several variables:** Introduction to function of severable variables, limit and continuity of function of several variables, Partial derivatives and Differentials, Differentiability of function of two variables, Conditions for commutativity of independent variables in higher ordered derivatives, Derivatives of implicit functions, Schwarz theorem | 1 | 33% |
| 3 | **Application of partial derivatives:**<br>Euler's theorem for homogeneous functions, Young's theorem, Extreme values of function of severable variables, Application of Lagrange's method of undetermined multiplies, Problems on Taylor and Maclaurin theorems for function of two variables. | 1 | 33% |

## Reference Books:

1. 'Differential Calculus' by Shantinarayan, S. Chand, New Delhi.
2. 'An Introduction to Linear Algebra, by V. Krishnamurthy, V P Mainra, J L Arora, Affiliated East-west Press Pvt Ltd., New Delhi.
3. Advanced Calculus, R C Buck, Mac Millan.
4. Kalan Shashtra Part I, D H Pandya and N D Suthar, University Granth Nirman Board (Gujarati).
5. Kalan Shashtra Part Il, A M Vaudya and V H Pandya, University Granth Nirman Board.
6. Linear Algebra Problem Book, P R Holmos, Cambridge University Press.
7. Topics in Algebra, I N Herstein, Wiley Eastern Ltd.
8. Linear Algebra, Gupta K P, Pragati Prakashan, Meerut.

## Suggested Readings:

1. James Stewart: "Calculus" Cengage publications, 7th edition, 4th Reprint 2019.
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed. (Reprint), 2016.

**Online Resources:**

1. https://www.youtube.com/watch?v=L6_c6qvlB8I&list=PLzJaFd3A7DZuyLLbmVpb9e9VLf3Q9cYBL
2. https://www.classcentral.com/subject/maths
3. https://youtu.be/BnE_MJaU8B

**Practical / Activities:**

1. Assignment
2. Quiz/ unit test

| Sr. No. | List of practical | Credit |
|---|---|---|
| 1 | Applications of Vector Space | |
| 2 | Applications of Subspaces | |
| 3 | Applications of Basis | |
| 4 | To Expand linearly independent set to a basis of a vector space | |
| 5 | Verification on Dimension theorem | |
| 6 | Verifications on Linear transformation | |
| 7 | Verifications on Rank-Nullity theorem | |
| 8 | To find the inverse of a Linear transformations | 1 |
| 9 | To find composition of linear maps | |
| 10 | Application of Limit and Continuity (Two Practical) | |
| 11 | Application of Partial Derivatives (Two Practical) | |
| 12 | Application of Lagrange's method of undermined multiplies | |
| 13 | Application of Euler's theorem | |
| 14 | Application of Taylor's and Maclaurin's theorems | |

**Reference Books:**

1. Linear Algebra, Gupta K P, Pragati Prakashan, Meerut
2. Differential Calculus' by Shantinarayan, S. Chand, New Delhi
3. Linear Algebra Problem Book, P R Holmos, Cambridge University Press

**Suggested Readings:**

1. James Stewart: "Calculus" Cengage publications, 7th edition, 4th Reprint 2019
2. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed. (Reprint), 2016

**Online Resources:**

1. https://www.classcentral.com/subject/maths
2. https://www.youtube.com/watch?v=WX6O9TiFYsA&list=PLU6SqdYcYsfIJRl8mo2Rv1MpdvmVD0YyI
3. https://www.youtube.com/watch?v=L6_c6qvlB8I&list=PLzJaFd3A7DZuyLLbmVpb9e9VLf3Q9cYBL

**Practical / Activities:**

1. Practices

**Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):**

| Course Outcomes | Program Outcomes 1:-Less relevant, 2:- Mild relevant 3:- Highly relevant | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 2 | 2 | | 2 | | 2 | | 3 | |
| CO2 | 2 | 3 | | | 1 | | 1 | | | | 2 |
| CO3 | 2 | 2 | 1 | 2 | 1 | | | | | 2 | |
| CO4 | 2 | 1 | 1 | | 1 | | 1 | 1 | | | 2 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Programme Code** | DPMAT | | | **Programme Name** | Diploma Programme of Mathematics | | | |
| **Course Code** | DPMAT302DSC | | | **Semester** | III | | | |
| **Numerical Analysis** | | | | | | | | |
| **Course Type** | Discipline Specific Course | | | **Total Credit** | Theory | Practical | Total | |
| | | | | | 3 | 1 | 4 | |
| **Teaching time (hours)** | **Examination Marking scheme** | | | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Practical** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15 X 2=30 | 25 | 25 | 50 | 00 | 75 | 25 | 100 |

**Prerequisites:** Basic understanding of calculus, algebra, and elementary numerical methods.

**Course Objective:**

a) To develop the basic understanding of numerical algorithms and skills to implement algorithms to solve mathematical problems on the computer.
b) Develop proficiency in numerical techniques for differentiation, integration.
c) An introduction to a broad range of numerical methods for solving mathematical problems that arise in Science and Engineering.

**Course Outcomes:** At the end of the course, students shall be able to

| | |
|---|---|
| CO1 | Students will understand and apply finite difference tables and Gregory-Newton's interpolation formulas for accurate data interpolation. |
| CO2 | Understand the difference operators and their application in interpolation techniques. |
| CO3 | Evaluate a derivative at a value using an appropriate numerical method and solving ordinary differential equations using various methods. |
| CO4 | Develop practical proficiency in numerical analysis techniques, for differentiation, integration, and solution of differential equations. |

| Unit | Content | Credit | Weightage |
|---|---|---|---|
| 1 | **Errors in numerical calculations:** Absolute, Relative and percentage errors, A General errors formula, Errors in a series approximation.<br><br>**Finite differences table and theory of interpolation:** Ascending and Descending differences, Symbolic operators Difference of polynomial, Factorial polynomials, Gregory-Newton's forward and backward interpolation formula. | 1 | 33% |
| 2 | **Divided differences:** Newton's divide difference interpolation formula, Lagrange's interpolation formula for equal and unequal intervals.<br>**Central difference interpolation formula:** Gauss forward and backward interpolation formula, Stirling interpolation formula, Bessel's interpolation formula. | 1 | 33% |
| 3 | **Numerical differentiation and integration & numerical solution of ordinary differential equation:** Trapezoidal rule, Simpson's 1/3 rule, Simpson's 3/8 rule, Picard's method, Taylor's method, Euler's Method, Modified Euler's Method. | 1 | 34% |

## Reference Books:

1. Introductory Methods of Numerical Analysis, S.S.Sastry, PHI Publication, New Delhi, 5th Edt., 2012.
2. Numerical Analysis by Kunz, McGraw Hill.
3. Numerical Analysis by R. Gupta, Anmol Pub. Pvt.Ltd, New Delhi.
4. Numerical Analysis P. N. Chatterjiaeons Prakashanmandir, Meerut.
5. Methods in Numerical Analysis K. W. NelsonMac-Millan.
6. Numerical Methods Dr. V. N. Vedomurthy, Vikas Publishing House Pvt. Ltd.
7. Numerical Methods in Engineering and Science, Dr. B. S. Grewal, Khanna Pub.

## Suggested Readings:

1. Numerical Analysis by Richard L. Burden, J. Douglas Faires.
2. Numerical Mathematics and Computing by E. Ward Cheney and David R. Kincaid.

## Online Resources:

1. https://www.vedantu.com
2. https://ocw.mit.edu

**Practical / Activities:**

1. Quiz/unit test
2. Assignment

| Sr. No. | List of practical | Credit |
|---|---|---|
| 1 | Application of Gregory-Newton forward formula | 01 |
| 2 | Application of Gregory-Newton backward formula | |
| 3 | Applications of Newton's divided difference formula | |
| 4 | Application of Lagrange's interpolation formula for unequal intervals | |
| 5 | Application of Gauss forward interpolation formula | |
| 6 | Application of Gauss backward interpolation formula | |
| 7 | Application of Stirling interpolation formula | |
| 8 | Application of Bessel's interpolation formula | |
| 9 | Application of Numerical differentiation | |
| 10 | Application of Trapezoidal rule | |
| 11 | Application of Simpson's 1/3 rule | |
| 12 | Application of Simpson's 3/8 rule | |
| 13 | Application of Picard's method | |
| 14 | Application of Taylor's method | |
| 15 | Application of Euler's method & Modified Euler's method | |

**Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):**

| Course Outcomes | Program Outcomes 1:-Less relevant, 2:- Mild relevant 3:- Highly relevant | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | 2 | 2 | | | 2 | | | | 3 | |
| CO2 | 2 | 3 | | 2 | 1 | | 1 | | | | 2 |
| CO3 | 3 | 1 | | 1 | | 1 | | 1 | | 2 | |
| CO4 | 2 | 1 | 1 | | | 1 | | 1 | | | 1 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Programme Code** | DPMAT | | | **Programme Name** | Diploma Programme of Mathematics | | | |
| **Course Code** | DPMAT401DSC | | | **Semester** | IV | | | |
| **Advanced Calculus** | | | | | | | | |
| **Course Type** | Discipline Specific Course | | | **Total Credit** | Theory | Practical | Total | |
| | | | | | 3 | 1 | 4 | |
| **Teaching time (hours)** | **Examination Marking scheme** | | | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Practical** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15 X 2=30 | 25 | 25 | 50 | 00 | 75 | 25 | 100 |

**Prerequisite:** Basic knowledge of algebra, geometry, trigonometry, elementary functions, differentiation and integration.

**Course Objective:**

a) To acquire comprehensive knowledge of vector calculus, and for enhancing problem-solving skills in multivariable calculus.
b) To provide the student with the skills of vector calculus operations which are needed for further study in mathematics.
c) Utilize this understanding in various scientific and engineering disciplines.

**Course Outcomes:** At the end of the course, students shall be able to

| | |
|---|---|
| CO1 | Solve mathematical problems involving convergence and special properties of Beta and Gamma function. |
| CO2 | Apply double and triple integrals to solve complex geometric and physical problems. |
| CO3 | Perform the vector calculus through the application of vector differential calculus. |
| CO4 | Apply advanced calculus techniques to solve practical problems. |

| Unit | Content | Credit | Weightage |
|---|---|---|---|
| 1 | **Curvature & Radius of Curvature:**<br>Curvature of a plane curve, radius of curvature of a plane curve, singular points of a plane curve, points of inflection for a plane curve.<br>**Beta and Gamma functions:**<br>Definitions of the Beta function and Gamma function, Convergence of the Beta function and Gamma function, relation between them, properties and applications, several forms of Beta function. | 1 | 33% |
| 2 | **Multiple Integrals:**<br>Double Integrals, Integrals on non-rectangular regions, transformation to polar coordinate, changing the order of integration, triple integration and transformation to polar and cylindrical coordinates, and problems based on them. | 1 | 33% |
| 3 | **Vector Calculus, Line & Surface Integrals:**<br>Gradient of a scalar function, divergence and curl of a vector function, definition of line integral, surface and volume integrals, Green's theorem, Stoke's and Gauss's Divergence theorem, and it's applications. | 1 | 34% |

## Reference Books:

1. Integral Calculus, Shantinarayan S. Chand, New Delhi (Course Book).
2. Advanced Calculus, D V Widder, Prentice Hall, New Delhi.
3. Advanced Calculus Vol: I & II, T M Apostol, Blaisdoll.
4. Advanced Calculus, R C Buck, MacMillan.
5. Kalan Shashtra Part I, D H Pandya and N D Suthar, University Granth Nirman Board (Gujarati).
6. Kalan Shashtra Part Il, A M Vaudya and V H Pandya, University Granth Nirman Board (Gujarati).
7. Calculus, James Stewart, Sixth edition, (E-Book).

## Suggested Readings:

1. Advanced Calculus Lynn H. Loomis and Shlomo Strenberg, Harvard University.
2. Kalan Shashtra Part Il, A M Vaudya and V H Pandya, University Granth Nirman Board (Gujarati).

## Online Resources:

1. https://www.youtube.com/watch?v=4QFsiXfgbzM&list=PLbRMhDVUMngeVrxtbBz-n8HvP8KAWBpI5

2. https://www.youtube.com/watch?v=9sLsX9DV5Fs&list=PLU6SqdYcYsfIvbXltebRgBfmgxRiP-gTJ

**Practical / Activities:**

1. Assignment
2. Quiz

| Sr. No. | List of Practical | Credit |
|---|---|---|
| 1 | Application of Radius of curvature of plane curve | 01 |
| 2 | Application of points of inflection for a plane curve | |
| 3 | Application of Beta function | |
| 4 | Application of Gamma function | |
| 5 | Application of relation of Beta & Gamma function | |
| 6 | Application of double Integration | |
| 7 | Application of change of order of Integration | |
| 8 | Application of transformation coordinates systems | |
| 9 | Application of triple Integration | |
| 10 | Application of Line integral | |
| 11 | Application of Surface Integral | |
| 12 | Application of Green's Theorem | |
| 13 | Application of Stokes' theorem | |
| 14 | Application of Gauss's divergence theorems. | |

**Reference Books:**

1. Linear Algebra, Ramchandra Rao, P. Bhimasankar, Tata Mac Graw Hill.
2. Topics in Algebra, I N Herstein, Wiley Eastern Ltd.
3. An Introduction to Linear Algebra' by V. Krishnamurthy, V P Mainra, J L Arora, Affiliated East-west Press Pvt Ltd., New Delhi .

**Suggested Readings:**

1. James Stewart: "Calculus" Cengage publications, 7th edition, 4th Reprint 2019.

**Online Resources:**

1. https://www.classcentral.com/subject/maths
2. https://youtu.be/BnE_MJaU8B

**Practical / Activities:**

1. Practices

**Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):**

| Course Outcomes | Program Outcomes 1:-Less relevant, 2:- Mild relevant 3:- Highly relevant | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | 2 | 1 | 1 | 2 | | 1 | 2 | | 3 | |
| CO2 | 2 | 3 | | | 1 | 1 | | | | | 2 |
| CO3 | 3 | 1 | 1 | | | | 1 | | | 2 | |
| CO4 | 2 | 1 | 1 | | 1 | | | 1 | | | 1 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Programme Code** | DPMAT | | | **Programme Name** | Diploma Programme of Mathematics | | | |
| **Course Code** | DPMAT402DSC | | | **Semester** | IV | | | |
| **Advanced Linear Algebra** | | | | | | | | |
| **Course Type** | Discipline Specific Course | | | **Total Credit** | Theory | Practical | Total | |
| | | | | | 3 | 1 | 4 | |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Practical** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15 X 2=30 | 25 | 25 | 50 | 00 | 75 | 25 | 100 |

**Prerequisite:** A solid understanding of basic linear algebra, including vector spaces, matrix operations, and systems of linear equations.

**Course Objective:**

(a) The main objective of this course is to solve problems involving norms, inequalities, and orthogonalization processes.
(b) Master advanced topics in the course of linear algebra to solve higher-dimensional problems.
(c) Develop a deep understanding of the course content to analyse and solve complex mathematical problems in both theoretical and applied contexts.

**Course Outcomes:** At the end of the course, students shall be able to

| | |
|---|---|
| CO1 | Understand and apply the concepts of matrices of linear transformations to analyze the invertibility of systems of linear equations. |
| CO2 | Understand the concepts of Dual spaces, and Inner product space. |
| CO3 | Master the concepts of inner product spaces for applications in mathematical analysis and problem-solving. |
| CO4 | Apply eigenvalues and eigenvectors of linear operators to diagonalize real and symmetric matrices. |

| Unit | Content | Credit | Weightage |
|---|---|---|---|
| 1 | **Matrices of a Linear Transformation:** Definition of a matrix of a linear transformation, Linear transformation associated with a matrix, the dimension of L(U,V) and its determination, Rank and Nullity of a matrix, invertibility of system of linear equations. | 1 | 33% |
| 2 | **Linear Functional and Duality:** Definition of linear functional and its examples, definition of Dual space and Dual basis and its examples, adjoint of a linear operator, its properties and examples. **Inner Product Space:** Definition of inner product space, Norm, Orthogonality, Schwarz's & Triangular inequality, Parallelogram law, Orthonormal basis, Gram-Schmidt orthogonalization process (without proof) and its examples | 1 | 33% |
| 3 | **Eigen Values and Eigen Vectors:** Eigen values and Eigen vectors of a linear transformation, Characteristic polynomial, Cayley – Hamilton theorem, finding inverse of a matrix using Cayley – Hamilton theorem, minimal polynomial deductions. | 1 | 34% |

## Reference Books:

1. An Introduction to Linear Algebra' by V. Krishnamurthy, V P Mainra, J L Arora, Affiliated East-west Press Pvt Ltd., New Delhi.
2. Linear Algebra, Ramchandra Rao, P. Bhimasankar, Tata Mac Graw Hill.
3. Topics in Algebra, I N Herstein, Wiley Eastern Ltd.
4. Linear Algebra, S K Berberion, Oxford University Press.
5. Linear Algebra Problem Book, P R Holmos, Cambridge University Press.
6. Linear Algebra, Sharma and Vashishtha, Krishna Prakashan, Meerut.

## Suggested Readings:

1. James Stewart: "Calculus" Cengage publications, 7th edition, 4th Reprint 2019.
2. S. Kumaresan, "Linear Algebra a Geometric Approach", PHI.

## Online Resources:

1. https://youtu.be/BnE_MJaU8B
2. https://www.classcentral.com/subject/maths
3. https://www.youtube.com/watch?v=L6_c6qvlB8I&list=PLzJaFd3A7DZuyLLbmVpb9e9VLf3Q9cYBL

**Practical / Activities:**

1. Assignment
2. Quiz/unit test

| Sr. No. | List of Practical | Credit |
|---|---|---|
| 1 | Applications of a linear transformation associated with given matrix | 01 |
| 2 | Applications of a matrix associated with linear transformation | |
| 3 | Find the kernel & the Range of Matrices | |
| 4 | Verifications of Rank-Nullity theorem on matrices | |
| 5 | Application of solution of system of linear equations | |
| 6 | Application of Linear functional | |
| 7 | Application of Adjoint of a linear Operator | |
| 8 | Application of a Dual Space | |
| 9 | Application to verify inner product space | |
| 10 | Application of Schwarz's & Triangular inequality | |
| 11 | Application of Gram-Schmidt orthogonalization process | |
| 12 | Application of Cayley – Hamilton theorem | |
| 13 | Application of Eigen value and Eigen vectors of a linear transformation | |
| 14 | Application of minimal polynomial deduction | |

**Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):**

| Course Outcomes | Program Outcomes 1:-Less relevant, 2:- Mild relevant 3:- Highly relevant | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 2 | 2 | | 2 | | 1 | | 3 | |
| CO2 | 3 | 1 | 2 | | 1 | | 2 | | | | 2 |
| CO3 | 2 | 2 | | 1 | | 1 | | | 1 | 2 | |
| CO4 | 2 | 1 | 1 | 1 | | | 1 | | | | 1 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Programme Code** | DPMAT | | | **Programme Name** | | Diploma Programme of Mathematics | | |
| **Course Code** | DPMAT403DSC | | | **Semester** | | IV | | |
| **Mathematical Modeling** | | | | | | | | |
| **Course Type** | Discipline Specific Course (Minor) | | | **Total Credit** | | Theory | Practical | Total |
| | | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Practical** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15 X 2=30 | 25 | 25 | 50 | 00 | 75 | 25 | 100 |

**Prerequisite:** Basic knowledge of calculus and algebra.

**Course Objective:**

(d) After going through this course, the students will be able to solve differential equations used in mathematical modelling.
(e) Understand fundamental concepts and assumptions underlying mathematical models in epidemiology, including compartmental models.
(f) To understand the role of inventory management in business and operations.

**Course Outcomes:** At the end of the course, students shall be able to

| | |
|---|---|
| CO1 | Interpret and analyze solutions obtained from mathematical models applied to differential equations. |
| CO2 | Student will be able to study epidemic situations using different Mathematical models. |
| CO3 | Analyze and differentiate between different types of inventory and their respective costs, and model. |
| CO4 | Apply mathematical modelling technique to solve real-world problems. |

| Unit | Content | Credit | Weightage |
|---|---|---|---|
| 1 | **Solution of a differential equation:** Power series solution of a differential equation about an ordinary point, solution about a regular singular point, Bessel's equation and Legendre's equation. | 1 | 33% |
| 2 | **Mathematical Models in epidemiology:** Introduction to the subject, its scope and limitation, classification of models, SI model, SIS model with constant coefficient, SIS model with coefficient as a function of time t, SIS model with constant number of carriers, SIS model when the carriers is a function of time t, SIR model, Epidemics with vaccination. | 1 | 33% |
| 3 | **Mathematical Models in Inventory Management:** Importance of Inventory Management, Types of Inventory, Inventory Costs: Holding, Ordering, and Shortage Costs, Inventory Management Systems, Economic Order Quantity (EOQ) Model: Basic EOQ Model, EOQ with Quantity Discounts. | 1 | 34% |

**Reference Books:**

1. Mathematical Modeling- J N Kapoor, New Age Publishers.Linear Algebra, Ramchandra Rao, P. Bhimasankar, Tata Mac Graw Hill.
2. J. N. Kapur, Mathematical Models in Biology and Medicine, East–West press Pvt. Ltd., 1992.
3. Mathematical Biology I : J.D. Murray, Springer.
4. "Inventory Management and Production Planning and Scheduling" by Edward A. Silver, David F. Pyke, and Rein Peterson.
5. "Inventory Control and Management" by Donald Waters.
6. T. Myint-U and LokenathDebnath, Linear Partial Differential Equation for Scientists and Engineers, Springer, Indian reprint,2006.
7. F.l3rauer and c. castillo-chavez, Mathematical Models in PopulationBiology aud Epidemiolo gY, SPringer, 2Q12.
8. Raisinghania, M. D. (2019). *Ordinary and Partial Differential Equations* (Revised 21st ed.). S. Chand Publishing. ISBN: 9788121908837.

**Suggested Readings:**

1. Mathematical Modeling- J N Kapoor, New Age Publishers.Linear Algebra, Ramchandra Rao, P. Bhimasankar, Tata Mac Graw Hill.
2. Raisinghania, M. D. (2019). Ordinary and Partial Differential Equations (Revised 21st ed.). S. Chand Publishing. ISBN: 9788121908837.
3. "Inventory Control and Management" by Donald Waters

**Online Resources:**

1. https://youtu.be/DUkQlPPNjpg?feature=shared
2. https://youtu.be/gsUgDpGWk-M?feature=shared
3. https://youtu.be/VzlBEcs1fj4?feature=shared

**Practical / Activities:**

3. Assignment
4. Quiz/unit test

| Sr. No. | List of Practical | Credit |
|---|---|---|
| 1 | Applications of a differential equation using the power series method around an ordinary point. | 01 |
| 2 | Applications of a differential equation using the Frobenius method around a regular singular point. | |
| 3 | Solve Bessel's equation using power series or Frobenius method. | |
| 4 | Simulate the basic SI model using numerical methods. | |
| 5 | Analyze the SIS model with a time-dependent transmission coefficient. | |
| 6 | Analyze the SIS model with a constant number of carriers. | |
| 7 | Simulate the SIR model using numerical methods. | |
| 8 | Study the impact of vaccination on epidemic spread using mathematical models. | |
| 9 | Perform sensitivity analysis on model parameters using numerical simulations. | |
| 10 | Calculate the Economic Order Quantity (EOQ) for a given set of data. | |
| 11 | Application of Determine the reorder point for a continuous review inventory system. | |
| 12 | Calculate the Economic Production Quantity (EPQ) for a given production scenario. | |
| 13 | Calculate the safety stock needed to maintain a desired service level. | |
| 14 | Application of Determine the order quantity in a periodic review inventory system. | |

**Mapping of Course Outcomes (COs) with Program Outcomes (POs) and Program Specific Outcomes (PSOs):**

| Course Outcomes | Program Outcomes 1:-Less relevant, 2:- Mild relevant 3:- Highly relevant | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | 3 | 2 | 2 | | 2 | | 1 | | 3 | |
| CO2 | 3 | 1 | 2 | | 1 | | 2 | | | | 2 |
| CO3 | 2 | 2 | | 1 | | 1 | | | 1 | 2 | |
| CO4 | 2 | 1 | 1 | 1 | | | 1 | | | | 1 |

GOKUL GLOBAL UNIVERSITY
Approved By Govt. of Gujarat
(Recognized by UGC under Section 22 & 2(f) of 1956)
(Gujarat Private State University Act 4 of 2018)

# COURSE STRUCTURE

## Bachelor of Science

## Botany

## Under

## National Education Policy (NEP-2020)

Faculty of Science
Gokul Science College
University Campus, State Highway-41,
Siddhpur - 384151, Dist. Patan, Gujarat, INDIA, Mobile : 9510973863
E- Mail : dean.fac.sci@gokuluniversity.ac.in, Website : www.gokuluniversity.ac.in

| PO No. | Program Outcome Description |
|---|---|
| PO1 | Foundational Knowledge: Graduates will possess a strong foundation in the fundamental concepts, theories, and principles of their chosen discipline, as per the prescribed curriculum. |
| PO2 | Practical Skills: Students will acquire practical skills relevant to their field, including laboratory techniques, data collection, analysis, and interpretation. |
| PO3 | Critical Thinking: Graduates will develop critical thinking skills to analyze, evaluate, and solve scientific problems, applying logical reasoning and evidence-based approaches. |
| PO4 | Effective Communication: Students will demonstrate effective communication skills, both orally and in writing, to convey scientific ideas and findings to different audiences. |
| PO5 | Collaboration and Teamwork: Graduates will work collaboratively in teams, engaging in effective communication, cooperation, and coordination to accomplish shared objectives. |
| PO6 | Information Literacy: Students will develop information literacy skills to access, evaluate, and utilize scientific information from diverse sources, including digital resources. |
| PO7 | Ethical Awareness: Graduates will demonstrate ethical awareness and responsibility in scientific practice, understanding the importance of integrity, honesty, and ethical conduct. |
| PO8 | Lifelong Learning: Students will develop a commitment to lifelong learning, staying updated with advancements in their field and engaging in continuous professional development. |
| PO9 | Societal Impact: Graduates will recognize the social and ethical implications of scientific knowledge and contribute positively to society through their discipline. |

| PSO No. | Program Specific Outcome Description |
|---|---|
| PSO1 | Botanical Knowledge and Diversity: Graduates of the B.Sc. Botany program will develop a comprehensive understanding of plant biology, including plant anatomy, physiology, taxonomy, and ecology. They will be able to identify and classify diverse plant species. |
| PSO2 | Plant Conservation and Sustainable Practices: Graduates will demonstrate an understanding of plant conservation principles and possess skills to manage and protect plant ecosystems. They will promote sustainable practices, contribute to biodiversity conservation, and raise awareness about the importance of plant conservation. |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF BOTANY**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Certificate | UG | I | Discipline Specific Course (Major-1) | CPBOT101DSC | Introduction to Plant World | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | CPZOO101DSC | Non-Chordates I-Protista to Pseudocoelomates | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Minor) | CPCHE101DSC/ CPMIC101DSC | General Chemistry-I/ Introduction to Microbial World | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi-Disciplinary Course | CP101MDC | Basics of computer application | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | CP101AEC | Communication Skills-1 | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Indian Knowledge System | CP101IKS | Indian Constitution | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | CP101SE | Photography Basics | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF BOTANY**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Certificate | UG | II | Discipline Specific Course (Major-1) | CPBOT201DSC | Morphology and tissue system in plant | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | CPZOO201DSC | Non-Chordates II coelomates | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Minor) | CPCHE201DSC/ CPMIC201DSC | General Chemistry-II/ Systematics bacteriology | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi-Disciplinary Course | CP201MDC | Basic Statistics | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | CP201AEC | Communication Skills-2 | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Value added Course-I | CP201VAC | Fundamentals of Nutrition | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | CP201SE | Cyber Security | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF BOTANY**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion / Quiz) | SEE (Summative) | |
| 1 | Diploma | UG | III | Discipline Specific Course (Major-1) | DPBOT301DSC | MYCOLOGY AND PHYTOPATHOLOGY | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | DPBOT302DSC | ARCHEGONIATE | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Major-3) | DPCHE301DSC / DPMIC301DSC / DPZOO301DSC | ORGANIC CHEMISTRY/ MICROBIAL PHYSIOLOGY AND METABOLISM/ PRINCIPLES OF ECOLOGY | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi-Disciplinary Course | DP301MDC | ARTIFICIAL INTELLIGENCE(AI): - Knowledge Representation and Reasoning | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | DP301AEC | CREATIVE WRITING ESSENTIAL | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Indian Knowledge System | DP301IKS | YOGA | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | DP301SEC | PRESENTATION SKILLS | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF BOTANY**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Diploma | UG | IV | Discipline Specific Course (Major-1) | DPBOT401DSC | ANATOMY OF ANGIOSPERMS | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | DPBOT402DSC | ECONOMIC BOTANY | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Major-3) | DPCHE401DSC/ DPMIC401DSC/ DPZOO401DSC | INORGANIC CHEMISTRY/ MICROBIAL DIVERSITY/ COMPARATIVE ANATOMY OF VERTEBRATES | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Discipline Specific Course (Minor) | DPCHE403DSC | INDUSTRIAL CHEMICAL AND ENVIRONMENT | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | DP401AEC | PERSONALITY DEVELOPMENT | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Value added Course-I | DP401VAC | SPORTS AND FITNESS | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | DP401SEC | STRESS MANAGEMENT | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Programme Code** | | **CPBOT** | | **Programme Name** | Certificate Programme of Botanical Science | | |
| **Course Code** | | CPBOT101DSC | | **Semester** | I | | |
| **INTRODUCTION OF PLANT WORLD** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | Theory | Practical | Total |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite** **:** The students must have core subjects like Biology in their Higher Secondary level.

**Rationale :** Studying reproductive processes in diverse plants, alongside taxonomy, physiology, genetics, and biotechnology, deepens understanding of Botany's complexity.

**Course Objective:**

It is fascinating to study the wide spectrum of reproductive processes in algae, fungi, lichens, bryophytes, gymnosperms, and flowering plants. A student of Botany has been learning these aspects together with taxonomy, anatomy, plant pathology, plant breeding, microbiology, plant physiology, plant biochemistry, ecology, cytology, genetics, cytogenetics, molecular biology and plant biotechnology.

**Course Outcome:**

| | |
|---|---|
| **CO 1** | Discuss the basics of virus discovery, evolution, and classification |
| **CO 2** | Discuss the basics of fungi discovery, evolution, and classification |
| **CO 3** | Discuss the basics of Bacteria discovery, evolution, and classification |
| **CO 4** | Discuss the basics of Fungi discovery, evolution, and classification |

| Unit | Topic | Content | Hours | Weightage |
|---|---|---|---|---|
| 1 | | **Diversity of plants and Microbes** | 15 | 33% |
| | 1.1 | Introduction to plant diversity, concept of plant kingdom, different systems of classification | | |
| | 1.2 | **Viruses:** Physiochemical and biological characteristics, General structure.<br>**Bacteria**: Archaebacteria and Eubacteria General characteristics, structure and types. | | |
| | 1.3 | **Fungi**: General characteristics, general structure and reproduction. Saccharomyces, Aspergillus, Agaricus Economic importance of Microbes in agriculture and industry | | |
| 2 | | **Cyanobacteria and Algae** | 15 | 33% |
| | 2.1 | **Cyanobacteria**: Occurrence and range of thallus organization, Characteristic features, cell structure and heterocyst structure, Method of reproduction (general), Nostoc, Oscillatoria (life cycles) | | |
| | 2.2 | **Algae**: Occurrence and range of thallus organization, Characteristic features, cell structure and types of reproduction | | |
| | 2.3 | Economic importance of algae i.e. role of algae in environment, agriculture and industry. Ulothrix and Sargassum (Life cycles). | | |
| 3 | | **Archegoniate plants** | 15 | 33% |
| | 3.1 | **Bryophytes**: Occurrence and range of thallus organization, Characteristic features. Riccia, Funaria. (Life cycles) Ecological and economical importance of bryophytes | | |
| | 3.2 | **Pteridophytes**: Occurrence, Characteristic features. Psilotum, Selaginella, Equisetum, Nephrolepis. (Life cycles) Ecological and economical importance of Pteridophytes | | |
| | 3.3 | **Gymnosperms**: Characteristic features, Cycas (life cycle). Ecological and economical importance of Gymnosperms | | |

## Reference Books:


- Gangulee, S. C., Das, K.S, Dutta, C.D. and Kar, A.K. (1968) College Botany Vol. I and Vol. II
- Smith, G. M. - (1972) Cryptogamic Botany Vol. I and Vol. II . McGraw-Hill.
- Verma, J.P. - (1968) The Bacteria, Vikas Publications
- Clifton, A. (1950) Introduction to Bacteria, McGraw - Hill
- Parihar, N.S. -(1956) Bryophyta
- Parihar, N.S. -(1955) Pteridophyte
- Vashishta, B.R. -(1962) Botany for Degree Students: Vol. II Fungi

# LIST OF PRACTICALS

1. Study of Simple and Compound microscope
2. EMs/Models of viruses (bacteriophage)
3. Types of Bacteria from temporary/permanent slides/photographs
4. Type study of cyanobacteria: Nostoc and Oscillatoria
5. Type study of algae: Ulothrix and Sargassum
6. Type study of fungi: Saccharomyces, Aspergillus and Agaricus
7. Type study of bryophytes: Riccia and Funaria
8. Type study of pteridophytes: Psilotum, Selaginella, Equisetum and Nephrolepis
9. Type study of gymnosperms: cycas

## Reference Books:


- Gangulee, S. C., Das, K.S, Dutta, C.D. and Kar, A.K. (1968) College Botany Vol. I and Vol. II
- Kumar & Bendre, A TEXT BOOK OF PRACTICAL BOTANY VOL-1, Rastogi Publications


### CO-PO & CO-PSO Mapping

| Course outcome | Programme Outcome [ 3: High relevant, 2: Mild relevant, 1: less relevant] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | | PSO1 | PSO2 |
| CO1 | 2 | 1 | - | - | 1 | - | - | 2 | - | | 3 | 2 |
| CO2 | 1 | 2 | 1 | 1 | - | 2 | - | - | 2 | | 2 | 1 |
| CO3 | 2 | 1 | 1 | - | - | - | 2 | 2 | - | | 2 | 2 |
| CO4 | 2 | 3 | - | - | - | 2 | 1 | - | - | | 3 | 1 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Programme Code** | | **CPBOT** | | **Programme Name** | Certificate Programme of Botanical Science | | |
| **Course Code** | | CPBOT201DSC | | **Semester** | II | | |
| **MORPHOLOGY AND TISSUE SYSTEM OF PLANT** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | **Theory** | **Practical** | **Total** |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite**: The students must have core subjects like Biology in their Higher Secondary level.

**Rationale:** Clearing the concepts of specialized cells that work together to perform specific functions, forming organs like leaves, roots, leaf, bract, peduncle &inflorescences.

**Course Objective:** Plant tissue is a collection of similar cells performing an organized function for the plant. Each plant tissue is specialized for a unique purpose, and can be combined with other tissues to create organs such as leaves, flowers, stems and roots. The following is a brief outline of plant tissues, and their functions within the plant.

**Course Outcome:**

| | |
|---|---|
| **CO 1** | Recognize relationships between plant embryonic structures and mature plant morphology |
| **CO 2** | Describe the organization and functions of plant organs (roots, stems, and leaves), and relate morphology to function |
| **CO 3** | Describe the features and functions of plant tissues, identify and describe cell types associated with each tissue, and relate cell and tissue morphology with function |
| **CO 4** | Differentiate between monocot and eudicot body plan characteristics, including organization of the vascular and ground tissues in stems and roots |

| Unit | Topic | Content | Hours | Weightage |
|---|---|---|---|---|
| 1 | | **Diverse morphological features in Angiosperms** | 15 | 33% |
| | 1.1 | Vegetative, floral & fruit morphology: | | |
| | 1.2 | Root, stem, leaf, bract, peduncle &inflorescences, | | |
| | 1.3 | Flower, fruit and seed | | |
| 2 | | **Plant tissue system (meristem & simple tissues)** | 15 | 33% |
| | 2.1 | **Cell wall**: Layers, functions, formation of cell wall. **Inter-cellular communications: Plasmodesmata. Pits**: Structure, types & functions. | | |
| | 2.2 | **Meristematic tissues**: Characteristic features, types of meristems. **Procambium& vascular cambium:** Structure & functions **Cork cambium**: Structure of periderm & formation | | |
| | 2.3 | **Permanent simple tissue:** Structure, types and functions of parenchyma, collenchyma, Sclerenchyma | | |
| 3 | | **Complex and Reproductive tissues** | 15 | 33% |
| | 3.1 | **Complex Tissue**: Conducting elements Xylem & Phloem, secretory tissue.<br>**Organs**: Structure of monocot & dicot root, stem and leaf | | |
| | 3.2 | **Adaptive & protective system: Epidermis**, **cuticle** – Structure, Variations and functions. **Stomata and trichomes**: Structure, types and functions. | | |
| | 3.3 | **Structural organization of flower**: Structure of anther, structure of ovules & the types, embryo sac. | | |

## Reference Books:


- Gangulee, H.C., Das, K.S, Dutta, C.D. and Kar, A.K. (1968) College Botany Vol. III
- Dutta A.C. - (1964) Botany for degree students.
- Hickey M, King. C.(2002) The Cambridge Illustrated Glossary of Botanical Terms, Cambridge University press.
- Sporne K.R. - (1968) The morphology of vascular plants.
- Sharma O.P - (1968) Plant Taxonomy
- Pandey B.P. - (1968) Taxonomy of Angiosperms.

- Vashishta P.C - (1968) Taxonomy of Angiosperms.
- K. Esau - (1961) Plant Anatomy.
- A Fahn - (1968) Plant Anatomy.
- B.P. Pandey - (1978) Plant Anatomy.


## LIST OF PRACTICALS

- Root Morphology and Morphology of Stem
- Morphology Leaf – I & II
- Morphology of Bracts, Peduncle, Inflorescence, And Flower – I, II, III
- Angiosperms Classification & Morphological description of Plant
- Study of tissue types in Dicot & Monocot stem and differences between them.
- Study of Dicot & Monocot root including differences with stem.
- Study the structure of leaf
- Study of variations in the different plant tissues.

## Reference Books:


- Kumar & Bendre, A TEXT BOOK OF PRACTICAL BOTANY VOL-2, Rastogi Publications.


**CO-PO & CO-PSO Mapping**

| Course outcome | Programme Outcome [ 3: High relevant, 2: Mild relevant, 1: less relevant] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | | PSO1 | PSO2 |
| CO1 | 2 | 2 | - | - | 1 | - | - | 2 | - | | 3 | 1 |
| CO2 | 1 | 3 | 1 | - | - | 2 | - | - | 2 | | 2 | 2 |
| CO3 | 2 | 2 | - | 1 | 1 | - | 2 | 2 | - | | 2 | 2 |
| CO4 | 2 | 2 | - | - | - | 2 | 1 | - | - | | 2 | 1 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Program Code** | | **DPBOT** | | **Program Name** | Diploma Program of Botanical Science | | |
| **Course Code** | | DPBOT301DSC | | **Semester** | III | | |
| **MYCOLOGY AND PHYTOPATHOLOGY** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | Theory | Practical | Total |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite**: The students must have core subjects like Botany, Chemistry, Microbiology and Zoology in their First and second semester level

**Rationale:** Knowledge of the fundamentals of fungal diversity, their roles in ecosystems, plant diseases, and applications in industry, agriculture, and medicine.

**Course Objective:**

The objective of the course to impart fundamental knowledge about some selected aspects of botany. The topics include General characteristics, Classification, and life cycles of major fungal groups (Phycomycetes, Ascomycetes, Basidiomycetes). It also explores Allied fungi, Lichens, and Mycorrhizae, emphasizing their roles in ecology, industry, and agriculture. Phytopathology, including host-pathogen relationships and disease management, is also addressed.

**Course Outcome:**

| | |
|---|---|
| **CO 1** | The student will be able to understand the characteristics, reproduction, and classification of fungi. |
| **CO 2** | The student understands and apply the fundamental characteristics, classification, occurrence, and economic importance of Allied Fungi, Lichens, and Mycorrhiza, and explore their applications in food industry, medicine, and agriculture. |
| **CO 3** | Students will be able to understand concepts of plant pathology, general symptoms of plant diseases, geographical distribution, host-pathogen relationships, and specific aspects of selected bacterial and fungal diseases. |

| Unit | Content | Hours | Weightage |
|---|---|---|---|
| 1 | **Fungi-1** | 15 | 34% |
| | General characteristics; Affinities with plants. Thallus organization; Cell wall composition; Nutrition; Classification (Ainsworth). | | |
| | Phycomycetes: Zygomycete: Characteristic features. Thallus organization; Reproduction; Life cycle and classification with reference to Rhizopus. | | |
| | Ascomycetes: General characteristics (asexual and sexual fruiting bodies); Life cycle and classification with reference to Claviceps. | | |
| | Basidiomycetes: General characteristics; Life cycle and Classification with reference to Agaricus. | | |
| 2 | **Fungi-2** | 15 | 33% |
| | Allied Fungi: General characteristics; Status of Slime molds, Classification; Occurrence; Types of plasmodia; Types of fruiting bodies. | | |
| | Lichens: Occurrence; General characteristics; Classification; Study of thallus (morphological and anatomical), Reproduction; Economic importance. | | |
| | Mycorrhiza: Ectomycorrhiza, Endomycorrhiza and their significance. | | |
| | Applied Mycology: Application of fungi in food industry (Flavor & texture, Fermentation, Baking, Organic acids, Enzymes, Mycoproteins); Medicines (Pharmaceutical preparations); Agriculture (Bio fertilizers). | | |
| 3 | **Phytopathology** | 15 | 33% |
| | Definition, scope, and importance | | |
| | Terms and concepts; General symptoms. | | |
| | Geographical distribution of diseases. Host-Pathogen relationships. | | |
| | Pathogen, Symptoms, Dissemination, Disease cycle and control measures of following plant diseases: Bacterial diseases – Citrus canker. | | |
| | Fungal diseases – White rust of crucifers, Black rust of wheat. | | |

## Reference Books:

1. Agrios, G.N. (1997) Plant Pathology, 4th edition, Academic Press, U.K.
2. Alexopoulos, C.J., Mims, C.W., Blackwell, M. (1996). Introductory Mycology, John Wiley & Sons (Asia) Singapore. 4th edition.
3. O.P. Sharma (1997) TEXTBOOK OF THALLOPHYTES, 2nd edition, Med Tech Science Press

## LIST OF PRACTICALS

1. Rhizopus: study of asexual stage from temporary mounts and sexual structures through permanent slides/photographs/charts.
2. Claviceps: study of asexual stage from temporary mounts. Study of Sexual stage from permanent slides/photographs/charts.
3. Agaricus: Specimens of button stage and full-grown mushroom; sectioning of gills of Agaricus. Permanent slides/photographs/charts.
4. Lichens: Study of growth forms of lichens (crustose, foliose and fruticose) on different substrates
5. Study of thallus and reproductive structure (apothecium) through Permanent slides/photographs/charts/specimen.
6. Mycorrhizae: Ectomycorrhiza and Endomycorrhiza (Photographs).
7. Phytopathology: Study of Plant diseases: Citrus Canker, White rust of crucifers and Black rust of wheat.

## Reference Books:

1. N. Arumugam, Annie Ragland, V. Kumaresan, Fungi and Plant Pathology 3RD edition, Saras Publication
2. Dubey, R.C., Maheshwari, D.K., (2000). "Practical Mycology" S. Chand Publishing, New Delhi.
3. Mukherji, K.G., Chamola, B.P., Upreti, D.K., Upadhyay, R.K., "Biology of Lichen" Aravalli Books International Publication, New Delhi.
4. Bendre A.M., Ashok Kumar, A Textbook of Practical Botany 1, Rastogi Publication, New Delhi.

## CO-PO & CO-PSO Mapping

| Course outcome | Program Outcome [ 3: High relevant, 2: Mild relevant, 1: less relevant] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | | PSO1 | PSO2 |
| CO1 | 2 | 2 | - | - | 1 | 1 | - | 1 | - | | 2 | 2 |
| CO2 | 2 | 3 | 2 | - | - | 2 | - | 1 | 2 | | 2 | 1 |
| CO3 | 1 | 2 | 1 | 1 | - | - | 2 | 2 | - | | 3 | 2 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **program Code** | | **DPBOT** | | **Program Name** | Diploma Program of Botanical Science | | |
| **Course Code** | | DPBOT302DSC | | **Semester** | III | | |
| **ARCHEGONIATE** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | Theory | Practical | Total |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite** : The students must have core subjects like Botany, Chemistry, Microbiology and Zoology in their First and second semester level.

**Rationale** : Clearing the concepts on completion of this course the student will be able to basic Develop critical understanding on morphology, anatomy and reproduction of Bryophytes, Pteridophytes and Gymnosperms.

**Course Objective:**

The objective of the course to impart fundamental knowledge about some selected aspects of botany. The topics include General characteristics, morphology, anatomy and reproduction, Economic importance of Bryophytes, Pteridophytes and Gymnosperms.

**Course Outcome:**

| | |
|---|---|
| **CO 1** | Student will be able to learn about general characteristics, land adaptations, classification, life cycle, morphology, anatomy, reproduction, and economic importance of Bryophytes. |
| **CO 2** | Student will be able to learn about the general characteristics, economic importance, and taxonomy of Pteridophytes, specifically Equisetum and Nephrolepis, including their morphology, anatomy |
| **CO 3** | Students will be able to understand the general characteristics, classification, and economic importance of Gymnosperms, while also describing their affinities with Pteridophytes and Angiosperms, and the morphology and anatomy of Cycas. |

**Content**

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | **Bryophytes** | 1 | 30 % |
| | General characteristics of Bryophytes; Adaptations to land habit; Classification (Rothmaler's); Alternation of generations. | | |
| | Classification (up to family), morphology, anatomy and reproduction of Marchantia. | | |
| | Classification (up to family), morphology, anatomy and reproduction of Funaria | | |
| | Vegetative reproduction and economic importance of bryophytes. | | |
| II | **Pteridophytes** | 1 | 45 % |
| | General characteristics of Pteridophytes; Classification (Smith); Economic importance of Pteridophytes. | | |
| | Classification (up to family), morphology, anatomy and reproduction of Equisetum (Developmental details not to be included). | | |
| | Classification (up to family), morphology, anatomy and reproduction of Nephrolepis (Developmental details not to be included). | | |
| | Heterospory and seed habit. | | |
| III | **Gymnosperms** | 1 | 33 % |
| | General characteristics, classification of Gymnosperms (Sporne, 1965). | | |
| | Affinities with Pteridophytes and Angiosperms. | | |
| | Morphology, anatomy (leaflets and coralloid root) and reproduction of Cycas (Developmental details not to be included). | | |
| | Economic importance of Gymnosperms. | | |

**Reference Books:**

1. Vashistha, P.C., Sinha, A.K., Kumar, A. (2010)." Botany for Degree Students PTERIDOPHYTA". S. Chand Publication. Delhi, India.
2. Bhatnagar, S.P. & Moitra, A. (1996). Gymnosperms. New Age International (P) Ltd Publishers, New Delhi, India.
3. Vashishta B.R., Sinha A.K., Kumar A., "Botany for Degree Students BRYOPHYTA" S. Chand Publication. Delhi, India.
4. Vashistha, P.C., Sinha, A.K., Kumar, A. (2010)." Botany for Degree Students GYMNOSPERMS". S. Chand Publication. Delhi, India.
5. Singh V., Pande P.C., Jain D.K., "A Textbook of Botany ARCHEGONIATE" S. Chand Publication. Delhi, India.

## LIST OF EXPERIMENTS

1. Marchantia- Morphology of thallus, whole mount of rhizoids & scales, vertical section of thallus through Gemma cup, whole mount of Gemmae (temporary slides), vertical section of Antheridiophore, Archegoniophore, longitudinal section of Sporophyte (all permanent slides).
2. Funaria- Morphology, whole mount of leaf, antheridia and archegonial heads, operculum, peristome, annulus, spores (temporary slides); permanent slides showing antheridia and archegonial heads; longitudinal section of capsule and protonema.
3. Equisetum- Morphology, transverse section of internode, longitudinal section of strobilus, transverse section of strobilus, whole mount of spores (wet and dry) (temporary slide), transverse section of rhizome (permanent slide).
4. Nephrolepis- Morphology, vertical section of sporophyll, whole mount of sporangium, whole mount of spores (temporary slides), transverse section of rachis, whole mount of prothallus with sex organs and young sporophyte (permanent slide).
5. Cycas- Morphology (coralloid roots, bulbil, leaf, microsporophyll, megasporophyll), vertical section of leaflet, whole mount of spores (temporary slides), vertical section of microsporophyll, longitudinal section of ovule (permanent slide).

## Reference Books:

- Bendre A.M., Ashok Kumar, A Textbook of Practical Botany 1, Rastogi Publication, New Delhi.

**CO-PO & CO-PSO Mapping**

| Course outcome | Program Outcome [ 3: High relevant, 2: Mild relevant, 1: less relevant] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | | PSO1 | PSO2 |
| CO1 | 2 | 2 | - | - | 1 | 1 | - | 1 | - | | 2 | 2 |
| CO2 | 2 | 3 | 2 | - | - | 2 | - | 1 | 2 | | 2 | 1 |
| CO3 | 1 | 2 | 1 | 1 | - | - | 2 | 2 | - | | 3 | 2 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | |
|---|---|---|---|---|---|---|
| **Program Code** | **DPBOT** | | **Program Name** | Diploma Program of Botanical Science | | |
| **Course Code** | DPBOT401DSC | | **Semester** | IV | | |
| **ANATOMY OF ANGIOSPERMS** | | | | | | |
| **Course type:** | Discipline Specific Course | | **Total Credit:** | **Theory** | **Practical** | **Total** |
| | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite** : The students must have core subjects like Botany, Chemistry, Microbiology and Zoology in their First and second semester level.

**Rationale** : On completion of this course the student will be able to develop an understanding of concepts and fundamentals of plant anatomy.

**Course Objective:**

1. To discuss important results on Classification of tissues, types of vascular bundles, Evolution concept of organization of shoot and root apex, Secondary growth in plants.

**Course Outcome:**

| | |
|---|---|
| **CO 1** | The student will be able to known different kind of tissue systems and its classification, anatomical features of monocot & dicot leaf, stem, root. |
| **CO 2** | They can analyse the structure, organization, and function of plant meristems and apical tissues, also theories of shoot and root apex organization, as well as the specialized epidermal structures such as trichomes and stomata and its functions. |
| **CO 3** | The student will be able to develop understanding about cambium, secondary growth and wood anatomy |

**Content**

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | **Anatomy** | 1 | 34 % |
| | The three tissue systems, types of cells and tissues. | | |
| | Classification of tissues; Simple and complex tissues; tracheary elements and sieve elements. | | |
| | Types of vascular bundles; Structure of dicot & monocot stem and leaf. | | |
| | Ergastic substances (starch grains of Potato & Wheat, Aleurone layer of Maize, Aleurone crystal of Castor seed), Hydathodes, Cavities, Cystolith and Laticifers. | | |
| II | **Meristems** | 1 | 33 % |
| | Definition & characteristics of meristem, Evolution concept of organization of shoot apex (Apical cell theory, Histogen theory and Tunica Corpus theory). | | |
| | Organization of root apex (Histogen theory, Koper-Kappe theory and Quiescent center theory). | | |
| | Epidermal tissue system; cuticle, epicuticular waxes. | | |
| | Trichomes (Uni-and Multicellular, Glandular and Nongranular, two examples of each), Stomata: types, location, structure & function, classification (Metcalfe and Chalk). | | |
| III | **Secondary growth** | 1 | 33 % |
| | Structure, function and activity of cambium; Secondary growth definition and types, normal and anomalous. | | |
| | Secondary growth in Sunflower stem and root. | | |
| | Anomalous Secondary growth in Salvadora stem and Tinospora aerial root. | | |
| | Sapwood and heartwood; Ring and diffuse porous wood; Tyloses, Periderm and Lenticels. | | |

**Reference Books:**

1. Dickison, W.C. (2000). Integrative Plant Anatomy. Harcourt Academic Press, USA.
2. Fahn, A. (1974). Plant Anatomy. Pergmon Press, USA.

## LIST OF EXPERIMENTS

**Practical / Activities:**

1) Study of anatomical details through permanent slides/temporary stain mounts/ macerations/ museum specimens with the help of suitable examples.
2) Ergastic substances (Aleurone layer of Maize, Aleurone crystal of Castor seed), Hydathodes, Cavities, Cystolith (Ficus leaf).
3) Apical meristem of root and shoot.
4) Xylem: Tracheary elements-tracheids, vessel elements; thickenings (Sunflower & Cucurbita stem).
5) Wood: ring porous; diffuse porous; tyloses; heart- and sapwood (chart).
6) Phloem: Sieve tubes-sieve plates; companion cells (Cucurbita stem).
7) Epidermal system: stomata types (Dicot & Monocot); trichomes: non-glandular (Abutilon/Cotton), glandular (Ocimum), Periderm (PS) & Lenticels (PS).
8) Root: Secondary growth (Sunflower root & aerial root of Tinospora).
9) Stem: secondary growth (Sunflower & Salvadora stem).

## Reference Books:

1. Raven, P. H., Evert, R. F., & Eichhorn, S. E. (1999). "Biology of Plants." W.H. Freeman and Company

**CO-PO & CO-PSO Mapping**

| Course outcome | Program Outcome [ 3: High relevant, 2: Mild relevant, 1: less relevant] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | | PSO1 | PSO2 |
| CO1 | 2 | 2 | - | - | 1 | 1 | - | 1 | - | | 2 | 2 |
| CO2 | 2 | 3 | 2 | - | - | 2 | - | 1 | 2 | | 2 | 1 |
| CO3 | 1 | 2 | 1 | 1 | - | - | 2 | 2 | - | | 3 | 2 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Program Code** | | **DPBOT** | | **Program Name** | Diploma Program of Botanical Science | | |
| **Course Code** | | DPBOT402DSC | | **Semester** | IV | | |
| **ECONOMIC BOTANY** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | **Theory** | **Practical** | **Total** |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite** : The students must have core subjects like Botany, Chemistry, Microbiology and Zoology in their First and second semester level.

**Rationale** : On completion of this course the student will be able to Increase the awareness and appreciation of plants & plant products encountered in everyday life and appreciate the diversity of plants and the plant products in human use.

**Course Objective:**

1. To discuss important results on Classification of economic important plants based on their uses and Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of plants.

**Course Outcome:**

| | |
|---|---|
| **CO 1** | Understand core concepts of Economic Botany and relate with environment, populations, communities, and ecosystems. |
| **CO 2** | Develop critical understanding on the evolution of concept of organization of apex new crops/varieties, importance of germplasm diversity, issues related to access and ownership |
| **CO 3** | Develop a basic knowledge of taxonomic diversity and important families of useful plants. |

**Content**

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | **Plant Resources-1** | 1 | 34 % |
| | Introduction of plant resources. | | |
| | Concept of centers of origin, their importance with reference to Vavilov's work. | | |
| | Classification of economic important plants based on their uses. | | |
| | Origin, morphology, processing and uses of Wheat and Rice, Brief account of millets. | | |
| II | **Plant Resources- 2** | 1 | 33 % |
| | Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of Chick pea and Pigeon pea. | | |
| | Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of Potato. | | |
| | Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of spices: Clove and Black Pepper | | |
| | Morphology and processing of Sugarcane, products and by-products of sugarcane industry. | | |
| III | **Plant Resources- 3** | 1 | 33 % |
| | Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of Groundnut and Mustard. | | |
| | Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of Fennel. | | |
| | Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of Tea. | | |
| | Introduction, Origin, cultivation, morphology, family, scientific name, useful parts, chemical constituents and uses of Cotton and Jute. | | |

**Reference Books:**

1. Kochhar, S.L. (2012). Economic Botany in Tropics, MacMillan & Co. New Delhi, India.
2. Wickens, G.E. (2001). Economic Botany: Principles & Practices. Kluwer Academic Publishers, The Netherlands.

# LIST OF EXPERIMENTS

## Practical / Activities:

Write Scientific name, Family, Useful part, Chemical constitutes, economic important and draw labelled diagram of plant:

1. Cereals: • Wheat (habit sketch, starch grains, micro-chemical tests).
   • Rice (habit sketch, study of paddy and grain, starch grains, micro-chemical tests).
2. Legumes: • Chick pea and Pigeon pea (habit, fruit, seed structure, micro-chemical tests).
3. Sources of oils and fats: • Mustard and Groundnut –plant specimen, seeds; tests for fats in crushed seeds.
4. Sources of sugars and starches: • Sugarcane • Potato: Potato tuber morphology, w.m. starch grains, Iodine test).
5. Spices: • Black pepper (habit) • Fennel (habit) and •Clove (habit).
6. Beverages: • Tea (plant specimen and tea leaves).
7. Fiber-yielding plants: • Cotton (specimen, whole mount of seed to show lint and fuzz; whole mount of fiber and test for cellulose), • Jute (specimen, transverse section of stem, test for lignin on transverse section of stem and fiber).

## Reference Books:

1. Raven, P. H., Evert, R. F., & Eichhorn, S. E. (1999). "Biology of Plants." W.H. Freeman and Company

### CO-PO & CO-PSO Mapping

| Course outcome | Program Outcome [ 3: High relevant, 2: Mild relevant, 1: less relevant] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | | PSO1 | PSO2 |
| CO1 | 2 | 2 | - | - | 1 | 1 | - | 1 | - | | 2 | 2 |
| CO2 | 2 | 3 | 2 | - | - | 2 | - | 1 | 2 | | 2 | 1 |
| CO3 | 1 | 2 | 1 | 1 | - | - | 2 | 2 | - | | 3 | 2 |

GOKUL GLOBAL UNIVERSITY

Approved By Govt. of Gujarat
(Recognized by UGC under Section 22 & 2(f) of 1956)
(Gujarat Private State University Act 4 of 2018)

# COURSE STRUCTURE

## Bachelor of Science

## Chemistry

## Under

## National Education Policy (NEP)-2020

Faculty of Science
Gokul Science College
University Campus, State Highway-41,
**Siddhpur** - 384151, **Dist.** Patan, Gujarat, INDIA, **Mobile :** 9510973863
**E- Mail :** dean.fac.sci@gokuluniversity.ac.in, **Website :** www.gokuluniversity.ac.in

## BACHELOR OF SCIENCE PROGRAM OUTCOMES (PO)

| PO NO. | PROGRAM OUTCOME DESCRIPTION |
|---|---|
| PO1 | FOUNDATIONAL KNOWLEDGE: GRADUATES WILL POSSESS A STRONG FOUNDATION IN THE FUNDAMENTAL CONCEPTS, THEORIES, AND PRINCIPLES OF THEIR CHOSEN DISCIPLINE, AS PER THE PRESCRIBED CURRICULUM. |
| PO2 | PRACTICAL SKILLS: STUDENTS WILL ACQUIRE PRACTICAL SKILLS RELEVANT TO THEIR FIELD, INCLUDING LABORATORY TECHNIQUES, DATA COLLECTION, ANALYSIS, AND INTERPRETATION. |
| PO3 | CRITICAL THINKING: GRADUATES WILL DEVELOP CRITICAL THINKING SKILLS TO ANALYZE, EVALUATE, AND SOLVE SCIENTIFIC PROBLEMS, APPLYING LOGICAL REASONING AND EVIDENCE-BASED APPROACHES. |
| PO4 | EFFECTIVE COMMUNICATION: STUDENTS WILL DEMONSTRATE EFFECTIVE COMMUNICATION SKILLS, BOTH ORALLY AND IN WRITING, TO CONVEY SCIENTIFIC IDEAS AND FINDINGS TO DIFFERENT AUDIENCES. |
| PO5 | COLLABORATION AND TEAMWORK: GRADUATES WILL WORK COLLABORATIVELY IN TEAMS, ENGAGING IN EFFECTIVE COMMUNICATION, COOPERATION, AND COORDINATION TO ACCOMPLISH SHARED OBJECTIVES. |
| PO6 | INFORMATION LITERACY: STUDENTS WILL DEVELOP INFORMATION LITERACY SKILLS TO ACCESS, EVALUATE, AND UTILIZE SCIENTIFIC INFORMATION FROM DIVERSE SOURCES, INCLUDING DIGITAL RESOURCES. |
| PO7 | ETHICAL AWARENESS: GRADUATES WILL DEMONSTRATE ETHICAL AWARENESS AND RESPONSIBILITY IN SCIENTIFIC PRACTICE, UNDERSTANDING THE IMPORTANCE OF INTEGRITY, HONESTY, AND ETHICAL CONDUCT. |
| PO8 | LIFELONG LEARNING: STUDENTS WILL DEVELOP A COMMITMENT TO LIFELONG LEARNING, STAYING UPDATED WITH ADVANCEMENTS IN THEIR FIELD AND ENGAGING IN CONTINUOUS PROFESSIONAL DEVELOPMENT. |

| | |
|---|---|
| PO9 | SOCIETAL IMPACT: GRADUATES WILL RECOGNIZE THE SOCIAL AND ETHICAL IMPLICATIONS OF SCIENTIFIC KNOWLEDGE AND CONTRIBUTE POSITIVELY TO SOCIETY THROUGH THEIR DISCIPLINE. |

## BACHELOR OF SCIENCE PROGRAM SPECIFIC OUTCOMES (PSO)

## B.SC. CHEMISTRY:

| PSO NO. | PROGRAM SPECIFIC OUTCOME DESCRIPTION |
|---|---|
| PSO1 | CHEMICAL KNOWLEDGE AND APPLICATION: GRADUATES OF THE B.SC. CHEMISTRY PROGRAM WILL POSSESS A COMPREHENSIVE UNDERSTANDING OF THE PRINCIPLES AND THEORIES OF CHEMISTRY. THEY WILL APPLY THIS KNOWLEDGE TO ANALYZE CHEMICAL PHENOMENA, CONDUCT EXPERIMENTS, AND SOLVE COMPLEX CHEMICAL PROBLEMS. |
| PSO2 | LABORATORY SKILLS AND SAFETY: GRADUATES WILL DEMONSTRATE PROFICIENCY IN LABORATORY TECHNIQUES, INCLUDING CHEMICAL SYNTHESIS, ANALYSIS, AND INSTRUMENTATION. THEY WILL PRIORITIZE SAFETY PROTOCOLS, ADHERE TO ETHICAL PRACTICES, AND EFFECTIVELY COMMUNICATE EXPERIMENTAL FINDINGS. |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF CHEMISTRY**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion / Quiz) | SEE (Summative) | |
| 1 | Certificate | UG | I | Discipline Specific Course (Major-1) | CPCHE101DSC | General Chemistry-I | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | CPPHY101DSC/ CPBOT101DSC/ CPMIC101DSC | Mechanics and Basic Electronics (MAE)/ Introduction to Plant world/ Introduction to microbial world | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Minor) | CPMAT101DSC/ CPZOO101DSC | Differential Calculus / Non-Chordates I: Protista to Pseudocoelomates | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi-Disciplinary Course | CP101MDC | Basics of computer application | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | CP101AEC | Communication Skills-1 | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Indian Knowledge System | CP101IKS | Fundamentals of Nutrition | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | CP101SE | Photography Basics | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | | | 550 |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF PHYSICS**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Certificate | UG | II | Discipline Specific Course (Major-1) | CPCHE201DSC | General Chemistry-II | 45 | 30 | 4 | 50 | 45 | 30 |
| 2 | | | | Discipline Specific Course (Major-2) | CPPHY201DSC/ CPBOT201DSC/ CPMIC201DSC | Wave, Electronics & Semiconductor Device (WES)/ Morphology and tissue system in plants/ Systematic bacteriology | 45 | 30 | 4 | 50 | 45 | 30 |
| 3 | | | | Discipline Specific Course (Minor) | CPMAT201DSC/ CPZOO201DSC | Integral Calculus & Differential Equation/ Non-Chordates Ii: Coelomates | 45 | 30 | 4 | 50 | 45 | 30 |
| 4 | | | | Multi-Disciplinary Course | CP201MDC | Basic Statistics | 45 | 30 | 4 | 50 | 45 | 30 |
| 5 | | | | Ability Enhancement Course | CP201AEC | Communication Skills-2 | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Indian Knowledge System | CP201IKS | Indian Constitution | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | CP201SE | Cyber Security | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | | | 550 |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF CHEMISTRY**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Diploma | UG | III | Discipline Specific Course (Major-1) | DPCHE 301DSC | Organic Chemistry | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | DPCHE 302DSC | Physical Chemistry | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Minor) | DPPHY 301DSC /DPMIC 301DSC /DPBOT301DSC | Optics modern physics and Laser/ Micronial physiology and Metabolism/ Mycology and Phytopathology | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi Disciplinary Course | DP301 MDC | Artificial Intelligence | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancment Course | DP301AEC | Creative Writing Essential | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Indian Knowledge System | DP301IKS | Yoga | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancment Course | DP301SE | Presentaion Skills | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

Faculty of Science
Gokul Science College
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**Siddhpur** - 384151, **Dist.** Patan, Gujarat, INDIA, **Mobile :** 9510973863
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**GOKUL GLOBAL UNIVERSITYFACULTY OF SCIENCEDEPARTMENT OF CHEMISTRY**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Diploma | UG | IV | Discipline Specific Course (Major-1) | DPCHE401DSC | Inorganic Chemistry | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | DPCHE402DSC | Analytical Chemistry | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Minor) | DPPHY401DSC/ DPMIC401DSC/ DPBOT401DSC | Electromagnetism, electronics and plasma physics/ Microbial Diversity/ Anatomy of Angiosperms | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Minor | DPCHE403DSC | INDUSTRIAL CHEMICALS AND ENVIRONMENT | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancment Course | DP401AEC | Personality Development | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Value added Course-I | DP401VAC | Sports and Fitness | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancment Course | DP401SE | Stress Management | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Programme Code** | | **CPPHY** | | **Programme Name** | | Certificate Programme of Physical Science | | |
| **Course Code** | | CPCHE101DSC | | **Semester** | | I | | |
| **General Chemistry 1** | | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | | Theory | Practical | Total |
| | | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Practical** | **Theory** | **Practical** | |
| 3 X 15 = 45 | 15X2=30 | 50 | 20 | 50 | 30 | 100 | 50 | |

**Pre-requisite:** The students must have core subject like Chemistry in their Higher Secondary level.

**Rationale :** The bachelor of science industrial chemistry is a popular course that allows students with a basic understanding of chemical compounds and their reactive tendencies to investigate how each chemical enhances or replenishes other sources when combined, resulting in better and stronger commodities.

**Course Objective:**

Students will gain an understanding of: chemical reactions and strategies to balance them. The relative quantities of reactants and products. The fundamental properties of atoms, molecules, and the various states of matter.

**Course Outcome:**

- Explain theoretical principles underlying molecular structure, bonding and properties
- Describe the importance and relevance of Hard and soft materials and also their characterization, properties and uses in engineering applications.
- Distinguish the difference between the different orders of reaction and apply accordingly.
- Utilize different thermo dynamical laws to explain course of reactions.
- Apply the different spectroscopic techniques to explain the inner & surface characteristic of molecules.

| Unit | Topic | Content | Hours | Weightage |
|---|---|---|---|---|
| 1 | | **General introduction of chemistry** | 15 | 33% |
| | 1.1 | Introduction to Chemical Sciences, Basics includes: Periodic properties, Effective nuclear charge, penetration of orbitals, variations of s, p, d and f orbital energies of atoms in the periodic table, electronic configurations, atomic and ionic sizes, ionization energies, electron affinity and electronegativity, polarizability, oxidation states, coordination numbers and geometries, hard soft acids and bases, molecular geometries Structure of an Atom, Formation of molecules –Kossel – Lewis approach to Chemical Bonding, Lewis Representations of Simple Molecules and Ions, Types of Bonds. | | |
| | | **Organic** | | |
| 2 | | **Structure and Bonding** | 15 | 33% |
| | 2.1 | Intramolecular forces (dipol-dipol interaction, vander waal's forces), Electromeric effect, Inductive effect, Resonance effect, Hyper conjugation (o, p-directing effect of Alkyl group, Stability of Carbonium ion and Free radicals), Hybridization, bond lengths and bond angles, bond energy, Localized and delocalized chemical bonds. | | |
| 3 | | **Physical** | 15 | 34% |
| | | **Solution and Volumetric Analysis** | | |
| | 3.1 | Introduction of Volumetric analysis, Types of Titration, Acid-Base titrations, Redox titrations, Complexometric titrations Precipitation Titrations, Back Titration, Numericals | | |

## Reference Books:

### Reference Books : Inorganic Chemistry

1 UGC Inorganic Chemistry - H. C. Khera (Pragati Prakashan).
2 Concise of Inorganic Chemistry - J. D. Lee.
3 Advanced Inorganic Chemistry- Cotton and Wilkinson.

4 Atomic Structure and Chemical Bonding by Manas Chanda
5 Principles of Inorganic Chemistry- B. R. Puri, L. R. Sharma & K. C. Kalia.
6 Shriver & Atkins' Inorganic Chemistry
7 General Inorganic Chemistry: J. A. Duffy, Longman (2nd Edition).
8 Basic Inorganic Chemistry : F. A. Cotton and G. Wilkinson, Wiley Eastern

## Reference Books: Organic Chemistry

1 Organic Reaction Mechanism, including Reaction Intermediates, V. K. Ahluwalia, Ane's Chemistry active series.
2 Undergraduate Organic Chemistry, volume-1, Jagdambasingh, L.D.S.Yadav, Pragati Prakashan, 8th edition-2013.
3 Structure and Mechanism in Organic Chemistry, C.K. Ingold, Cornell University Press.
4 A Guide Book to Mechanism in Organic Chemistry, Peter Sykes, Longman.
5 Textbook of Organic Chemistry by P S Kalsi, New Age International
6 Modern Principles of Organic Chemistry: M. K. Jain and S. C. Sharma.
7 Reaction Mechanism and Reagents in Organic Chemistry, Gurdeep R. Chatwal 4th edition, Himalaya Publication House.
8 Organic Chemistry Volume. I & II, S.M.Mukherji, S.P.Singh, R.P.Kapoor.

## Reference Books: Physical Chemistry

1 Physical Chemistry, B. K. Sharma, Goel Publication House. Meerut.
2 An Introduction of Physical Chemistry, D. K. Chakrabarty, Narosa Pub. House, New Delhi.
3 Principles of Physical Chemistry: B. R. Puri and L. R. Sharma.
4 A Text Book of Physical Chemistry: A. S. Negi and S. C. Anand.
5 Physical Chemistry, Pt. I & II: C. M. Gupta, J. K. Saxena and M. C. Purohit.
6 Atkins' Physical Chemistry, Oxford University Press.

## LIST OF EXPERIMENTS

### 1. Organic Chemistry

- Identification of an organic compound through the functional group analysis, Determination of melting point and boiling point, Preparation of suitable derivative.
- Candidate should perform the analysis of at least 10 compounds.

List of compounds

- **Acids:**

  Benzoic acid, Cinnamic acid, Phthalic acid, Oxalic acid, Succinic acid.

- Phenols:

  α–Naphthol, β– Naphthol.

- Bases:

  P-Toludine, Diphenylamine, Aniline, Methyl aniline.

- Neutrals:

  Naphthalene, Anthracene, Acetamide, Benzamide, Acetanilide, m-Dinitrobenzene, Urea, Thiourea, Toluene, Acetone, Benzaldehyde, Methyl acetate, Ethyl acetate, Chloroform, Carbon tetrachloride, Chlorobenzene,Nitrobenzene.

## 2. Volumetric Titrations

- To determine the strength of NaOH and $Na_2CO_3$ present in the solution mixture of NaOH & $Na_2CO_3$ and to find out their percentage composition.
- To determine the strength of $NaHCO_3$ and $Na_2CO_3$ present in the solution mixture of $NaHCO_3$ & $Na_2CO_3$ and to find out their percentage composition.
- To determine the Normality, gm/liter and molarities of $H_2C_2O_4.2H_2O$and $H_2SO_4$ present in the solution mixture of $H_2C_2O_4.2H_2O$ & $H_2SO_4$ by using X N NaOH and Y N $KMnO_4$ solutions.
- To determine the Normality, gm/liter and molarity of $H_2C_2O_4.2H_2O$ and $K_2C_2O_4$ present in the solution mixture of $H_2C_2O_4.2H_2O$ & $K_2C_2O_4$ by using X N NaOH and Y N $KMnO_4$ solutions.
- To determine the amount of $Ca^{+2}$ and $Mg^{+2}$ ion by EDTA solution from themixture solution of $CaCl_2$ and $MgCl_2$.

## 3. Demonstrations

- Calibration of burette and Pipette.
- M.P and B.P of organic compound

**CO-PO & CO-PSO Mapping**

| Course Outcomes | Program Outcomes 1: - Less relevant, 2: - Mild relevant, 3: - Highly relevant | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | **3** | **3** | **3** | **1** | **1** | | | **1** | | **3** | **3** |
| CO2 | **3** | **3** | **3** | | | **1** | | **1** | | **2** | **2** |
| CO3 | **3** | **3** | **3** | | **1** | | | **1** | | **2** | **3** |
| CO4 | **3** | **3** | **3** | | **1** | **1** | | **1** | **1** | **1** | **1** |
| CO5 | **2** | **2** | **2** | | **1** | **1** | **1** | **1** | **1** | **1** | **1** |
| CO6 | | | | **1** | | | | **1** | **1** | **1** | **1** |
| CO7 | | | | | **1** | **1** | | | | **1** | **1** |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Programme Code** | | **CPCHE** | | **Programme Name** | | Certificate Programme of Physical Science | | |
| **Course Code** | | CPCHE201DSC | | **Semester** | | II | | |
| **GENERAL CHEMISTRY 2** | | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | | **Theory** | **Practical** | **Total** |
| | | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Practical** | **Theory** | **Practical** | |
| 3 X 15 = 45 | 15X2=30 | 50 | 20 | 50 | 30 | 100 | 50 | |

**Pre-requisite**: The students must have chemistry as a core subject in their Higher Secondary level.

**Rationale:** Clearing the concepts of reactivity of Lanthanide series will help in the all-round development of students Knowledge, stereochemistry of organic compound and preparation of polymers can assist to learn reaction mechanism of organic molecule.

**Course Objectives:**

- To understand the core concepts of valence bond theories and F block elements.
- To understand organic chemistry i.e. stereochemistry, Conformers, isomers etc. and their application.
- To study about the polymerization reaction and application of polymers..

**Course Outcome:**

1. Students will have a firm foundation in the fundamentals and application of current chemical and scientific theories including those in Inorganic, Organic and Physical Chemistries.
2. Students will be able to design and carry out scientific experiments as well as accurately record and analyze the results of such experiments.
3. Students will be skilled in problem solving, critical thinking and analytical reasoning as
4. Applied to scientific problems.

| Unit | Topic | Content | Hours | Weightage |
|---|---|---|---|---|
| 1 | | **Inorganic chemistry** | 15 | 34% |
| | 1.1 | **Chemical bonding** | | |
| | | **Valence Bond Theory:** Introduction; Hitler-London theory (energy changes taking place during the formation of H2 Molecule, Pauling-Slater's Theory (orbital Overlap theory of Covalent Bond). Types of Bond, Covent bond, ionic bond, Coordination covalent bond Coordination bond and Wanderwals force bond. Hybridization and types of hybridization. Sp, $sp^2$,$sp^3$,$dsp^2$,$sp^3d$, $sp^3d^2$ | | |
| | 1.2 | **F- Block elements** | | |
| | | Lanthanide's electronic Configuration, Oxidation state, Lanthanide Contraction, Effects of Lanthanide Contraction, Separation method: (a). Solvent extraction method (b). Ion exchange method. | | |
| | 1.3 | **Noble gases** | | |
| | | Chemical properties of Noble gases, Chemistry of Xenon, Structure and Bonding in Xenon Compounds | | |
| 2 | | **Organic chemistry** | 15 | 33% |
| | | **Stereo chemistry** | | |
| | 2.1 | **Optical isomerism** | | |
| | | General, Discussion of elements of symmetry, Molecular Chirality, Enantiomers, Optical activity, Properties of enantiomers, Chiral and Achiral molecules with two stereo genic centers, Diastereomers, Threo and Erythro diastereomers, Meso Compounds. | | |
| | 2.2 | **Geometrical isomerism** | | |
| | | Definition and general discussion of geometric isomers, General methods of structure determination (physical methods), E-Z systems of nomenclature (Simple illustration should be given). | | |
| 3 | | **Physical chemistry** | | |
| | 3.1 | **Polymers and Fibers** | 15 | 33% |
| | | Introduction, Classification based on Source, Structure, Molecularforces. Polymerization and its mechanism. Definition of Rubber, Types of Rubber, Vulcanization of rubber. Application of Rubber. Biodegradable Polymers, Commercially important polymers- PE, PP, PS, PVC, ABS, PMMA, Glyptal | | |

| | | | | |
|---|---|---|---|---|
| | | and their uses.<br><br>Types of fibers – Natural, semi synthetic, synthetic fibers. Physical properties of fibers and uses of Cellulose acetate, Viscose Rayon, Nylon,Polyesters acrylic, Glass fibers and Liquid Crystals. | | |
| | **3.2** | **Chemical kinetics** | | |
| | | Rate of reaction, Order of reaction, Molecularity, Rate equation for second order reaction. (a=b) & (a≠b), Characteristics of second order reaction**,** Rate equation for third order reaction, Characteristics of third order reaction, Numerical. | | |

**Reference Books:**

**Reference Books: Inorganic Chemistry**

Advanced Inorganic Chemistry, Vol I & II. Satya Prakash, G.D. Tuli, S.K. Basu and R.D. Madan.

Inorganic Chemistry', D.F. Shriver, P.W. Atkins, 3rd Edition, Oxford, 1999.

Essentials of Nuclear Chemistry' H.J. Arnical, 4th Edition, New Age International, 1995.

Advanced Inorganic Chemistry - Raymond Chang

Inorganic Chemistry - P. L. Soni.

Co-ordination Chemistry – Banerjee.

**Reference Books: Organic Chemistry**


1 Organic Chemistry, R. T. Morrison and R. N. Boyd, Prentice-Hall.

2 Organic Chemistry, (Volume I, II & III. S. M. Mukherji, S. P. Singh and R. P. Kapoor.

3 Stereochemistry of Carbon Compounds, Ernest L. Eliel, McGraw Hill.

4 Stereochemistry of Organic Compounds, P.S. Kalsi, New Age International.

5 Stereochemistry of Organic Compounds, D. Nasipuri, New Age International.

6 Organic Chemistry by Francis A. Carey.

7 A Text Book of Organic Chemistry: (Volume I & II) O. P. Agarwal


**Reference Books: Physical Chemistry**


1 Physical Chemistry by R.A. Albert and R.J. Silby, John Wiley1995.

2 Advance Physical Chemistry by Gurdeep raj.

3 Essentials of Physical Chemistry, B. S. Bahal, G. D. Tuli and Arun Bahal, S. Chand & Co. New Delhi.

4 Elements of Physical Chemistry, B. R. Puri, L. R. Sharma and Madan Pathania Vishal Publishing Co. Jalandhar.

5 Principles of Physical Chemistry, Samuel H. Maron and Carl F. Prutton, Oxford & IBH Publishing Co. Pvt. Ltd. New Delhi.

6 Chemical Kinetics, G. R. Chatwal and Harish Mishra, Goel Publication House. Meerut.


**Practical list**

**1. Inorganic Chemistry**

- **Semi microAnalysis:**

  - Cation analysis; separation and identification of ions from group I, II, III-A, III-B, IV, V-A, V-B.
  - Anion analysis like

$Cl^-$, $Br^-$,$I^-$, $NO_3^-$, $NO_2^-$, $SO_4^{-2}$, $SO_3^{-2}$, $S^{-2}$, $CrO_4^{-2}$, $CO_3^{-2}$, $PO_4^{-3}$

(Water Soluble and insoluble).

- Candidate should perform the analysis of at least 10compounds.

2. Standardization

- Preparation of standard solution of succinic acid and standardization of NaOH/KOH solution.
- Preparation of standard solution of $Na_2S_2O_3$ and standardization of $I_2$ solution.
- Preparation of standard solution of Oxalic acid and standardization of $KMnO_4$ solution.
- Preparation of standard solution of $K_2Cr_2O_7$ and standardization of $FeSO_4$ solution.

**3. Preparation**

- Preparation of Urea Formaldehyde resin

**CO-PO & CO-PSO Mapping**

| Course Outcomes | Program Outcomes 1: - Less relevant, 2: - Mild relevant, 3: - Highly relevant | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | **3** | **3** | **3** | **1** | **1** | | | **1** | | **3** | **3** |
| CO2 | **3** | **3** | **3** | | | **1** | | **1** | | **2** | **2** |
| CO3 | **3** | **3** | **3** | | **1** | | | **1** | | **2** | **3** |
| CO4 | **3** | **3** | **3** | | **1** | **1** | | **1** | **1** | **1** | **1** |
| CO5 | **2** | **2** | **2** | | **1** | **1** | **1** | **1** | **1** | **1** | **1** |
| CO6 | | | | **1** | | | | **1** | **1** | **1** | **1** |
| CO7 | | | | | **1** | **1** | | | | **1** | **1** |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Programme Code** | | **DPCHE** | | **Programme Name** | Diploma program ofChemical Science | | |
| **Course Code** | | DPCHE301DSC | | **Semester** | III | | |
| **ORGANIC CHEMISTRY** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | Theory | Practical | Total |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite:**

1. Basic Knowledge of Organic Chemistry

**Rationale:** This syllabus covers a broad spectrum of topics within organic chemistry, focusing primarily on carbonyl compounds, electrophilic aromatic substitution, apply UV spectroscopy for structural analysis

**Course Objective:**

1. To develop understanding of the carbonyl compounds,
2. Understand substituent effects and reactions in aromatic compounds..
3. Learn UV spectroscopy principles and λmax prediction for conjugated systems.

**Course Outcome:**

| Sr No. | CO Statement | Unit |
|---|---|---|
| CO-1 | Understanding of carbonyl compounds, their preparation and applications. | 1 |
| CO-2 | Knowledge of electrophilic substitution reactions. | 2 |
| CO-3 | The course on Ultraviolet Spectroscopy covers electronic transitions, chromophores, and shifts, along with Woodward–Fieser rules and λmax calculations for conjugated systems. | 3 |

| Unit | Content | Hours | Weightage |
|---|---|---|---|
| 1 | **Carbonylcompounds:** Nomenclature of aliphatic, acyclic and aromatic carbonyl compounds. Structure reactivity of aldehydes and ketones and methods of preparation; Oxidation of primary and secondary alcohols using PCC, hydration of alkynes, action of Grignard reagent on esters. General mechanism of nucleophilic addition, and acid catalyzed nucleophilic addition Reactions.<br>**Mechanisms of following reactions:** Benzoic condensation, Knoevenagel condensation, Claisen Schmidt and cannizzaro reaction. Keto-enol tautomerism: Mechanism of acid and base catalyzed enolization. | **15** | **34%** |
| **2** | **Electrophilic aromatic Substitution:** Introduction, effect of substituent groups, determination of orientation and relative reactivity, classification of substituent groups, electrophilic substitution (ES) reactions. Nitration, Sulfonation, Halogenation, Friedel Craft alkylation and acylation, Orientation In mono and disubstituted benzene. Polynuclear hydrocarbon: Nomenclature, structure and synthesis of Naphthalene and its derivatives. Reactions (oxidation, reduction and electrophilic substitution reaction (ESR)) of naphthalene. | **15** | **33%** |
| **3** | **Ultraviolet Spectroscopy**<br>Type of electronic transitions, Effect of conjugation, Woodward –fisher rules, Concept of Chromophore and Auxochrome, Bathochromic, Hypsochromic, Hyperchromic, and Hypochromic shifts, Problems of conjugated enes, enones and aromatic ketones, aldehydes, acids and esters using empirical rules, numericals based on λmax. | **15** | **33%** |

## Reference Books:

1. Robert Thornot Morrison and Robert Neilson Boyd, “Organic Chemistry”, PrenticeHallofIndia Pvt Ltd, New Delhi, Sixth Edition, 1992.
2. Bhupinder Mehta, Manju Mehta, “Organic Chemistry”, Prentit Hall of India Pvt Ltd, NewDelhi, 2005.
3. James B Hedrickson Donald J. Cram and George S. Hammond, “Organic Chemistry”, Mc-Graw-Hill Kogakusha, Ltd., Third Edition.

4. Arun Bahl, B. S. Bahl, "Advance Organic Chemistry", S. Chand &Company Ltd., NewDelhi,First Edition, 2003.
5. Spectroscopy by P.S.Kalsi. 6 Edition.

Online Resources:

- https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=13G8VouhmrFfuhs6rkiyTA==
- https://nptel.ac.in/courses

## LIST OF EXPERIMENTS

**Organic Chemistry (**Candidate should perform the analysis of at least 7 compounds)

Identification of an organic compound through the functional group analysis,

- Determination of melting point and boiling point, Preparation of suitable derivative.
- Binary Organic Mixture: [Solid + Solid or Solid + liquid i.e. (acetone, methyl acetate, ethanol, benzene, $CCl_4$)].
- Determination of melting and boiling points of organic substances for two sessions.
- Organic analysis: Identification of acidic, basic, phenolic, and neutral organic
- substances.
- Detection of N, S and halogens, Test for aliphatic and aromatic nature of substances.
- Test for saturation and unsaturation.
- Identification of functional groups: i) Carboxylic acids ii) Phenols iii) Aldehydes iv) Ketones v)Esters vi) Carbohydrates vii) Amines viii) Amides ix) Halogen compounds.
- Preparation of derivatives for the functional groups.

**CO-PO Competency and Program Indicators (PI)**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | **3** | **3** | **3** | **1** | | **2** | **1** | **2** | | | | |
| CO2 | **3** | **3** | **1** | **1** | **1** | | | **1** | | | | |
| CO3 | **3** | **2** | **3** | | | | | | **1** | | | |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Programme Code** | | **DPCHE** | | **Programme Name** | Diploma program of Chemical Science | | | |
| **Course Code** | | **DPCHE302DSC** | | **Semester** | III | | | |
| **PHYSICAL CHEMISTRY** | | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | Theory | Practical | Total | |
| | | | | | 3 | 1 | 4 | |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** | |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 | |

**Pre-requisite:**

1. Basic Knowledge of Physical Chemistry

**Rationale:** This syllabus covers a broad spectrum of topics within Physical chemistry, focusing Wave mechanics, nuclear chemistry and valence theory of liquids.

**Course Objective:**

1. An advanced knowledge about the wave mechanics.

2. An in-depth study of the free particle system.

**Course Outcome:**

| Sr No. | CO Statement | Unit |
|---|---|---|
| CO-1 | Student after learning this course can be introduced about the basic postulates of quantum mechanics. | 1 |
| CO-2 | Understand the concept of nuclear particle | 2 |
| CO-3 | Learn the measurement of Surface tension, Viscosity, Optical activity, Refractive index. | 3 |

| Unit | Content | Hours | Weightage |
|---|---|---|---|
| 1 | **WaveMechanics:** Black Body Radiation & Quantum Theory, Basic postulates of quantum Mechanics, Photo electric effect: Wave particle duality of radiation, Compton effect, Free particle system, Particle in one-dimension box, Operator: Definition, Algebra of operators, Addition, Multiplication, Commutative properties, Linear operator, Commutator operators, Laplacian operator. | **15** | **34%** |
| **2** | **Nuclear Chemistry:** Concept of Nuclear particle, Definition of Isotopes, Isotones, Isobars, Isomers, Packing fraction, Nuclear binding energy, Nuclear coulomb barrier, Rate of ratio active disintegration, half-life period, Average life period, Rutherford'slaw (Group transfer law), Numerical. | **15** | **33%** |
| **3** | **The Valance Theory of Liquid:** Vapor-Pressure, Dipole moment and itsmeasurements & its application, Numerical, Surfacetension:(1)Measurement of surfacetension by stalagmometer. (2) Perachorandits applications, Measurement of viscosity by Ostwald-viscometer, Measurement of Opticalactivity by Polarimeter, Refractiveindex: (1)Specificrefraction (2)Molarrefraction( 3)Measurement of Refractiveindex by Abbe'sRefractometer. | **15** | **33%** |

## Reference Books:

1. Advance Physical Chemistry by Gurdeep Raj

2. Physical Chemistry (Question and Answers) by R.D. Madan, G.D. Tully, S. Chand.

3. Principal of Physical Chemistry by Puri, Sharma, Pathania.

4. Chemical Thermodynamics by R.P. Rastogi and R.R. Mishra.

5. Essentials of Physical Chemistry by B.S. Bahal, Arun Bahal, G.D. Tully.

6. Physical Chemistry by P.W. Atkins, 5th Edition, Oxford, 1994, 7th Edition,2002

Online Resources:

- https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=13G8VouhmrFfuhs6rkiyTA==

https://nptel.ac.in/courses

# LIST OF EXPERIMENTS

## Physical chemistry:(Any 7 out of 10)

1. Conductometric titration: - HCl / CH3COOH Vs NaOH
2. Conductometric titration: - HCl Vs NH4OH
3. pH- metric titration: -i. Calibration of pH - meter by 4 - pH buffer ii. HCl Vs NaOH
4. Determine the Dissociation constant of the acid of mixtures CH3COONa and CH3COOH by determine the PH.
5. Determine the specific refraction and molar refraction of the given liquid A, B and mixture C (A+B) and calculate the percentage composition of A and B in the mixture C by Abbe's Refractrometer.
6. Determine the molar refraction CH3COOC2H5, CH3COOC3H7 and CH3COOC4H9 and show the constancy of reaction equivalent of -CH2– Group by Abbe's Refractrometer.
7. To determine the viscosity of a different mixture of liquid A and B and determine the percentage composition of unknown mixture by graphical method.
8. To determine the surface tension and compare cleaning-efficiency of two samples of a detergent or soap with stalagmometer.
9. To study kinetic reaction of decomposition of H2O2 catalysis by iodine ion (Clock reaction).
10. Find the solubility and heat of solution of the given organic acid at two different temperatures.

**CO-PO Competency and Program Indicators (PI)**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | **3** | **3** | **2** | **1** | | **2** | **1** | **1** | | | | |
| CO2 | **3** | **2** | **1** | **1** | **1** | | | **2** | | | | |
| CO3 | **3** | **2** | **3** | | | | | | **1** | | | |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Programme Code** | | **DPCHE** | | **Programme Name** | Diploma program of Chemical Science | | |
| **Course Code** | | DPCHE401DSC | | **Semester** | IV | | |
| **INORGANIC CHEMISTRY** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | Theory | Practical | Total |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite:**

2. Basic Knowledge of Inorganic Chemistry

**Rationale:** This syllabus covers a broad spectrum of topics within inorganic chemistry, focusing primarily on Introduction to Chemistry of Coordination Compounds Historical perspectives, Nature of the Metal-Ligand Bond, Molecular Orbital theory, Inorganic polymer and purification of water.

**Course Objective:**

4. To understand the concept of Introduction to Chemistry of Coordination Compounds and Nature of the Metal-Ligand Bond.
5. To understand the concept of Inorganic polymer and Purification of Water.

**Course Outcome:**

| Sr No. | CO Statement | Unit |
|---|---|---|
| CO-1 | Understand the concept of coordination chemistry principles for synthesizing and characterizing compounds | 1 |
| CO-2 | Apply the concepts of molecular orbital theory. | 2 |
| CO-3 | Understand the concepts of types of inorganic polymers. | 3 |

| Unit | Content | Hours | Weightage |
|---|---|---|---|
| 1 | **Introduction to Chemistry of Coordination Compounds Historical perspectives:** Early ideas on coordination compounds, Basic terms and nomenclature, Types of ligands. Theories of coordination compounds, Effective atomic number rule, Eighteen electron Rule<br>**Nature of the Metal-Ligand Bond:** Valence Bond Theory: Hybridization of the central metal orbitals-sp3, sd3/d3s, sp3d2/d2sp3, sp2d, Inner and outer orbital complexes of. (Suitable examples of Mn(II), Fe(II), Fe(III), Co(II)/Co(III), Ni(II), Cu(II), Zn(II) complexes with ligands like Aqua, ammonia CN- and halides may be used) | **15** | **34%** |
| **2** | **Molecular Orbital Theory:** Comparing Atomic Orbitals and Molecular Orbitals, Linear combination of atomic orbitals to give molecular orbitals LCAO- MO approach for diatomic homonuclear molecules. Wave mechanical treatment for molecular orbitals (H2+ and H2), Molecular orbital Theory, Bond Order and magnetic property: with reference to O2, O2+, O2-, O22- | **15** | **33%** |
| **3** | **Inorganic polymer:** Types of inorganic polymers, comparisonwith organic polymers, synthesis, structural aspects and applications of silicones and siloxanes, Borazines, silicates and phosphazenes, and polysulfides.<br>**Purification of Water**: Different methods of purification of water for potable and industrial purposes, Soft and hard water, Desalination of sea water by reverse osmosis and electrodialysis. | **15** | **33%** |

## Reference Books:

6. J. D. Lee, 4th Edn., Concise Inorganic Chemistry, ELBS, The group III elements.
7. Puri, Sharma and Kalia, Milestone publishers, Principles of Inorganic Chemistry,Emeleus and Anderson, Modern Aspects of Inorganic Chemistry, page no.
8. James E. Huheey, Inorganic Chemistry: Principles of Structure and Reactivity, R. Gopalan, Universities Press India Pvt.Ltd. Inorganic Chemistry for Undergraduates.

Online Resources:

- https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=13G8VouhmrFfuhs6rkiyTA==
- https://nptel.ac.in/courses

## LIST OF EXPERIMENTS

**Inorganic Chemistry (**Candidate should perform the analysis of at least 7 compounds)

- Qualitative inorganic analysis: Analysis of Inorganic salt mixture containing two anions and two cations.
  Mixture containing four radicals. Anion should be ($CO_3^{-2}$,$NO_2^-$, $SO_3^{-2}$, $S^{-2}$, $Br^-$, $I^-$, $NO_3^-$, $SO_4^{-2}$, $CrO_4^{-2}$, $Cr_2O_7^{-2}$)

**CO-PO Competency and Program Indicators (PI)**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | **3** | **3** | **3** | **1** | | **2** | **1** | **2** | | | | |
| CO2 | **3** | **3** | **1** | **1** | **1** | | | **1** | | | | |
| CO3 | **3** | **2** | **3** | | | | | | **1** | | | |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Programme Code** | | **DPCHE** | | **Programme Name** | Diploma program of Chemical Science | | |
| **Course Code** | | **DPCHE402DSC** | | **Semester** | IV | | |
| **ANALYTICAL CHEMISTRY** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | Theory | Practical | Total |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite:**

1. Basic Knowledge of Analytical Chemistry

**Rationale:** This syllabus covers a broad spectrum of topics within analytical chemistry, focusing basic of analytical chemistry, spectroscopy and classical method of analysis.

**Course Objective:**

1. Analytical Chemistry for B.Sc. Semester 4 covers the fundamental techniques and principles used for the qualitative and quantitative analysis of chemical substances.
2. The course aims to provide students with a comprehensive understanding of various analytical methods and their applications in different fields.

**Course Outcome:**

| Sr No. | CO Statement | Unit |
|---|---|---|
| CO-1 | To understand the principles and methodologies of qualitative and quantitative analysis | 1 |
| CO-2 | To learn about various classical and modern analytical techniques | 2 |
| CO-3 | To develop skills in interpreting analytical data. To apply analytical techniques to solve chemical problems | 3 |

| Unit | Content | Hours | Weightage |
|---|---|---|---|
| 1 | **Introduction to Analytical Chemistry:** Definition and scope of analytical chemistry, Types of analysis: Qualitative and Quantitative, Analytical process: Sampling, sample preparation, analysis, and data interpretation, Errors in chemical analysis: Types, sources, and methods of minimization | 15 | 34% |
| 2 | **Classical Methods of Analysis:**<br>A) **Gravimetric Analysis:** Principle and steps involved, Precipitation, coagulation, and digestion, Filtration, washing, and drying, Calculations in gravimetric analysis<br>B) **Titrimetric Analysis:** Principles of titration and types of titrations, Acid-base titrations, Redox titrations, Complexometric titrations, Precipitation titrations, Indicators used in different types of titrations | 15 | 33% |
| 3 | **Instrumental Methods of Analysis**<br>**Chromatography:** Principle of adsorption and partition chromatography, column chromatography: adsorbents, classification of adsorbents, solvents, preparation of column, adsorption and applications. Thin Layer Chromatography: choice of adsorbent, choice of solvent, preparation of chromatogram, sample, R value and its applications. Paper chromatography, solvent used, Rf value, factors which affect Rf value. | 15 | 33% |

## Reference Books:

1. "Fundamentals of Analytical Chemistry" by Douglas A. Skoog, Donald M. West, F. James Holler, and Stanley R. Crouch

2. "Principles of Instrumental Analysis" by Douglas A. Skoog and F. James Holler

3. "Quantitative Chemical Analysis" by Daniel C. Harris

Online Resources:

https://epgp.inflibnet.ac.in

https://nptel.ac.in/courses

# LIST OF EXPERIMENTS

## Analytical Chemistry:(Any 7 out of 10)

- **Gravimetric Analysis**
  - Determination of sulfate as barium sulfate
  - Determination of nickel as nickel dimethylglyoximate
- **Titrimetric Analysis**
  - Standardization of NaOH using oxalic acid
  - Redox titration of iron(II) using potassium permanganate
  - Standardization of potassium permanganate using oxalic acid (Reduction-oxidation titration)
- **Spectroscopic Analysis**
  - Determination of λmax of a given compound using UV-Vis spectroscopy
- **Chromatographic Techniques**
  - Identification of amino acids and metal ions using paper chromatography.

**CO-PO Competency and Program Indicators (PI)**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | **3** | **3** | **3** | **1** | | **2** | **1** | **2** | | | | |
| CO2 | **3** | **3** | **1** | **1** | **1** | | | **1** | | | | |
| CO3 | **3** | **2** | **3** | | | | | | **1** | | | |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Programme Code** | | **DPCHE** | | **Programme Name** | | Diploma program of Chemical Science | | |
| **Course Code** | | DPCHE403DSC | | **Semester** | | IV | | |
| **INDUSTRIAL CHEMICALS AND ENVIRONMENT** | | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | | Theory | Practical | Total |
| | | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | | 75 | 25 | 100 |

**Pre-requisite:**

3. Basic Knowledge of Industrial chemicals and environment.

**Rationale:** This syllabus covers a broad spectrum of topics within Industrial chemicals and environment, focusing primarily on Inorganic chemicals, Environment and its segments and Energy & Environment.

**Course Objective:**

6. To understand the manufacture, applications, and hazards associated with handling key inorganic chemicals, including hydrochloric acid, nitric acid, sulfuric acid, caustic soda, borax, bleaching powder, sodium thiosulfate, hydrogen peroxide, potassium dichromate, and potassium permanganate.
7. To understand the concept of environmental impact of various energy sources, methods of managing nuclear pollution, and the role of biocatalysis in green chemistry and the chemical industry.

**Course Outcome:**

| Sr No. | CO Statement | Unit |
|---|---|---|
| CO-1 | Understand the Manufacture and Applications of Key Inorganic Chemicals | 1 |
| CO-2 | Analyze Environmental Segments and Ecosystems | 2 |
| CO-3 | To review the practical importance and relevance of process takes place in chemical industry. | 3 |

| Unit | Content | Hours | Weightage |
|---|---|---|---|
| 1 | **Inorganic Chemicals:** Mining and manufacturing of Sulphur, Manufacture of Sulphuric acid by DCDA process and its applications. Sulphur trioxide, Sodium Sulphate, Sodium Thiosulphate, Manufacturing technologies. Introduction to Fertilizer industries, manufacturing processes of Ammonia, Urea, Nitric acid, Phosphoric acid their uses and applications, NPK fertilizer. | **15** | **34%** |
| **2** | **Environment and its segments:** Air Pollution: Major regions of atmosphere, chemical and photochemical reactions in atmosphere. Air pollutants: types, sources, particle size and chemical nature; Photochemical smog: its constituents and photochemistry. Major sources of air pollution, Pollution by SO2, CO2, CO, NOx, $H_2S$ and other foulsmelling gases, methods of estimation of CO, NOx, SOx and control procedures, Effects of air pollution on living organisms and vegetation, Greenhouse effect and Global warming, Environmental effects of ozone, Ozone depletion by oxides of nitrogen, chlorofluorocarbons and halogens, Air pollution control, Settling Chambers, Venturi Scrubbers, Cyclones, Electrostatic Precipitators (ESPs). | **20** | **33%** |
| **3** | **Chlor-alkali and Heavy Inorganic industry:** Manufacturing of Caustic Soda and Chlorine by membrane cell, mercury & diaphragm process, Manufacturing of Sodium Bicarbonate. | **10** | **33%** |

## Reference Books:

1. Manahan, S.E. (2017),Environmental Chemistry, CRC Press.

2. Buchel, K.H.; Moretto, H.H.; Woditsch, P.(2003),Industrial Inorganic Chemistry, Wiley-VCH.
3. De, A.K.(2012), Environmental Chemistry, New Age International Pvt., Ltd.
4. Khopkar, S.M.(2010), Environmental Pollution Analysis, New Age International Publisher.

Online Resources:

- https://epgp.inflibnet.ac.in/Home/ViewSubject?catid=13G8VouhmrFfuhs6rkiyTA==
- https://nptel.ac.in/courses

## LIST OF EXPERIMENTS

1. Determination of dissolved oxygen in water.
2. Determination of Chemical Oxygen Demand (COD).
3. Determination of Biological Oxygen Demand (BOD).
4. Estimation of total alkalinity of water samples (CO3 2-, HCO3 - ) using double titration method.
5. Determination of Chloride ion.
6. To determine saponification value of oil sample
7. To prepare caustic soda by chemical method.
8. To determine the acid value of the given sample of oil.
9. Determine the total hardness of given water samples.

**CO-PO Competency and Program Indicators (PI)**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | **3** | **3** | **3** | **1** | | **2** | **1** | **2** | | | | |
| CO2 | **3** | **3** | **1** | **2** | **1** | | | **1** | | | | |
| CO3 | **3** | **2** | **3** | | | | | | **1** | | | |

GOKUL GLOBAL UNIVERSITY

Approved By Govt. of Gujarat
(Recognized by UGC under Section 22 & 2(f) of 1956)
(Gujarat Private State University Act 4 of 2018)

# COURSE STRUCTURE

## Bachelor of Science

## Physics

## Under

## National Education Policy (NEP)-2020

Faculty of Science
Gokul Science College
University Campus, State Highway-41,
**Siddhpur** - 384151, **Dist.** Patan, Gujarat, INDIA, **Mobile :** 9510973863
**E- Mail :** dean.fac.sci@gokuluniversity.ac.in, **Website :** www.gokuluniversity.ac.in

| PO No. | Program Outcome Description |
|---|---|
| PO1 | Foundational Knowledge: Graduates will possess a strong foundation in the fundamental concepts, theories, and principles of their chosen discipline, as per the prescribed curriculum. |
| PO2 | Practical Skills: Students will acquire practical skills relevant to their field, including laboratory techniques, data collection, analysis, and interpretation. |
| PO3 | Critical Thinking: Graduates will develop critical thinking skills to analyze, evaluate, and solve scientific problems, applying logical reasoning and evidence-based approaches. |
| PO4 | Effective Communication: Students will demonstrate effective communication skills, both orally and in writing, to convey scientific ideas and findings to different audiences. |
| PO5 | Collaboration and Teamwork: Graduates will work collaboratively in teams, engaging in effective communication, cooperation, and coordination to accomplish shared objectives. |
| PO6 | Information Literacy: Students will develop information literacy skills to access, evaluate, and utilize scientific information from diverse sources, including digital resources. |
| PO7 | Ethical Awareness: Graduates will demonstrate ethical awareness and responsibility in scientific practice, understanding the importance of integrity, honesty, and ethical conduct. |
| PO8 | Lifelong Learning: Students will develop a commitment to lifelong learning, staying updated with advancements in their field and engaging in continuous professional development. |
| PO9 | Societal Impact: Graduates will recognize the social and ethical implications of scientific knowledge and contribute positively to society through their discipline. |

| PSO No. | Program Specific Outcome Description |
|---|---|
| PSO1 | Physical Understanding and Application: Graduates of the B.Sc. Physics program will possess a thorough understanding of the principles and theories of physics. They will apply this knowledge to analyse and solve physical problems, design experiments, and make scientific observations. |
| PSO2 | Data Analysis and Modelling: Graduates will develop skills in data analysis, statistical methods, and mathematical modelling to interpret and predict physical phenomena. They will apply these skills to address real-world challenges and contribute to advancements in scientific research. |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF PHYSICS**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Certificate | UG | I | Discipline Specific Course (Major-1) | CPPHY101DSC | Mechanics and Basic Electronics (MAE) | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | CPMAT101DSC | Differential Calculus | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Minor) | CPCHE101DSC | General Chemistry-I | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi-Disciplinary Course | CP101MDC | Basics of computer application | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | CP101AEC | Communication Skills-1 | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Indian Knowledge System | CP101IKS | Indian Constitution | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | CP101SE | Photography Basics | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

**GOKUL GLOBAL UNIVERSITYFACULTY OF SCIENCEDEPARTMENT OF PHYSICS**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Certificate | UG | II | Discipline Specific Course (Major-1) | CPPHY201DSC | Wave, Electronics & Semiconductor Device (WES) | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | CPMAT201DSC | Integral Calculus & Differential Equation | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Minor) | CPCHE201DSC | General Chemistry-II | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi-Disciplinary Course | CP201MDC | Basic Statistics | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | CP201AEC | Communication Skills-2 | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Value added Course-I | CP201VAC | Fundamentals of Nutrition | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | CP201SE | Cyber Security | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

**GOKUL GLOBAL UNIVERSITY**
**FACULTY OF SCIENCE**
**DEPARTMENT OF PHYSICS**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Diploma | UG | III | Discipline Specific Course (Major-1) | DPPHY301DSC | OPTICS, MODERN PHYSICS & LASER(OMPL) | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | DPPHY302DSC | SOLID STATE, NUCLEAR & MATHEMATICAL PHYSICS(SSNM) | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Major-3) | DPMAT301DSC/DPCHE301DSC | | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi-Disciplinary Course | DP301MDC | ARTIFICIAL INTELLIGENCE(AI) :-Knowledge Representation and Reasoning | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | DP301AEC | CREATIVE WRITING ESSENTIAL | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Indian Knowledge System | DP301IKS | YOGA | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | DP301SEC | PRESENTATION SKILLS | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

**GOKUL GLOBAL UNIVERSITYFACULTY OF SCIENCEDEPARTMENT OF PHYSICS**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Diploma | UG | IV | Discipline Specific Course (Major-1) | DPPHY401DSC | ELECTROMAGNETISM, ELECTRONICS & PLASMA PHYSICS (EMEP) | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | DPPHY402DSC | QUANTUM MECHANICS, SOLID STATE & THERMODYNAMICS (QMSST) | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Major-3) | DPMAT401DSC | Advanced Calculus | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Discipline Specific Course (Minor) | DPCHE401DSC | Inorganic Chemistry | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | DP401AEC | PERSONALITY DEVELOPMENT | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Value added Course-I | DP401VAC | SPORTS AND FITNESS | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | DP401SEC | STRESS MANAGEMENT | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Programme Code** | | **CPPHY** | | **Programme Name** | Certificate Programme of Physical Science | | |
| **Course Code** | | CPPHY101DSC | | **Semester** | I | | |
| **MECHANICS AND BASIC ELECTRONICS(MAE)** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | Theory | Practical | Total |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite** **:** The students must have core subjects like Math's, Physics, and Chemistry in their Higher Secondary level.

**Rationale :** Knowledge of the fundamentals of electronics and major functioning of electronic devices can assist a mechanical engineer to better communicate with electrical and electronics engineers collaborating for the design/manufacturing of these systems

**Course Objective:**

The objective of the course to impart fundamental knowledge about some selected aspects of physics. The topics include Vectors algebra & Calculus Basic Electronics and Linear circuits, Laws of Motion & Dynamics of System of Particles and Elasticity, Oscillations, Gravitation. Some industry relevant topics are also covered under which basic concepts are taught.

**Course Outcome:**

(I) The student will be able to relate different kind of oscillations
(II) The student will be able to learn Standard differential equations.
(III) The student will be able to learn basics electronics and linear circuits.
(IV) The student will be able to learn laws of motions and dynamics of system of particles.

(V) They will be able to explain various natural vibration phenomena.

(VI) Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.

(VII) Apply the various procedures and techniques for the experiments.

| Unit | Topic | Content | Hours | Weightage |
|---|---|---|---|---|
| 1 | | **Vectors algebra & Calculus** | 15 | 33% |
| | 1.1 | Vectors and Scalars, Addition of Vectors, Resolution of Vectors, Scalar and Vector Products, Triple Products of Vectors, Scalar Triple Products, Some Important Conclusions from Scalar Triple Product, Vector Triple Products, Differentiation of a Vector with Respect to time | | |
| | 1.2 | Scalar and Vector Fields, Partial Differentiation and Gradient, Operation with ∇, The rate of flow of a Vector Field, Vector Integration, Surface Integral, Gauss's Divergence Theorem, Stoke's Theorem, Derivation of Green's Theorem from Gauss Divergence Theorem | | |
| 2 | | **Basic Electronics and Linear circuits** | 15 | 33% |
| | 2.1 | Electronic components, Basic idea of Passive components and Active components, Source of Electric Power, Batteries, Concept of Voltage Sources, Ideal Voltage Source, Concept of Current Source, Practical Current Source, Conversion of Voltage Source into Current Source and vice versa | | |
| | 2.2 | RC circuits analysis and time constant (Capacitor charging and discharging), RL circuits analysis (Growth and Decay of current), Ideal LC circuit, Series LCR circuit (for charge case) | | |
| 3 | | **Laws of Motion & Dynamics of System of Particles** | 15 | 34% |
| | 3.1 | Frames of reference, Newton's law of motion, Kinetic energy, Work and Work-Energy theorem, Calculation of Work done, Conservative and Non-Conservative force(definition), Potential Energy and Conservation of Energy | | |
| | 3.2 | Definition of Center of Mass, Center of mass of Two particle and several group of particles, Linear momentum and its Conservation Principle, Rocket Propulsion | | |
| | 3.3 | Collisions, Inelastic Collisions, Elastic Collisions (one- and two-dimension explanation) | | |

## Reference Books:


- Concept of physics by H C Verma part 1 Publisher: Bharati Bhawan
- Electricity and Magnetism by K.K.Tewary Publisher: S.Chand & Company Ltd.
- Sears and Zemansky's University physics with modern physics by H D Young Publisher: PEARSON
- Basic electronics and linear circuits by N N Bhargava, D C Kushreshtha,S C Gupta Publisher: Technical Teachers Training Institutes Chandigarh
- Mechanics Berkeley Physics course Vol 1
- Lectures on physics, R.P.Feynman, Vol 1
- Physics – Resnick and Holiday
- Principles of electronics by V.K. Mehta, S.Chand
- Electronics Device and Circuits by Allen Mottershead Pub: PHI


## LIST OF EXPERIMENTS

1) To determine the Moment of Inertia of a Fly Wheel.
2) To determine 'g' by bar pendulum.
3) To determine the Young's Modulus of long wire by Searl's method.
4) To study of Charging and Discharging of Capacitor and RC time constant.
5) To determine Low resistance by Projection method.
6) Verification of Steafan's law using AC source.
7) Damping coefficient, Relaxation and quality factor in the damped motion of a Simple Pendulum.
8) Study of Resonator.
9) Refractive index liquid using convex lens.

## Reference Books:


- B.Sc. Practical physics By C.L.Arora Pub: S.chand.
- A text book of Practical Physics By Indu Prakash & Ramkrishna Pub: Kitab Mahal, New Delhi.
- Practical Physics By S.L.Gupta and V. Kumar Pub: Pragati Prakashan, Meerut.
- B.Saraf et aI-Physics through experiments Vol. I & II.


### CO-PO & CO-PSO Mapping

| Course Outcomes | Program Outcomes 1: - Less relevant, 2: - Mild relevant, 3: - Highly relevant | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | **3** | **3** | **3** | **1** | **1** | | | **1** | | **3** | **3** |
| CO2 | **3** | **3** | **3** | | | **1** | | **1** | | **2** | **2** |
| CO3 | **3** | **3** | **3** | | **1** | | | **1** | | **2** | **3** |
| CO4 | **3** | **3** | **3** | | **1** | **1** | | **1** | **1** | **1** | **1** |
| CO5 | **2** | **2** | **2** | | **1** | **1** | **1** | **1** | **1** | **1** | **1** |
| CO6 | | | | **1** | | | | **1** | **1** | **1** | **1** |
| CO7 | | | | | **1** | **1** | | | | **1** | **1** |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Programme Code** | | **CPPHY** | | **Programme Name** | Certificate Programme of Physical Science | | |
| **Course Code** | | CPPHY201DSC | | **Semester** | II | | |
| **WAVE, OPTICS, ELECTROSTATICS & SEMICONDUCTOR DEVICE (WOES)** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | **Theory** | **Practical** | **Total** |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite**: The students must have core subjects like Math's, Physics, and Chemistry in their Higher Secondary level.

**Rationale:** Clearing the concepts of light and its wave optics will help in the all-round development of students Knowledge of the Sound & Ultrasonic Waves and Thermodynamics can assist to better communicate for the design/manufacturing of these systems

**Course Objective:**

(I) The objective of the course to impart fundamental knowledge about some selected aspects of physics. The topics include Vectors algebra & Calculus Basic Electronics and Linear circuits, Laws of Motion & Dynamics of System of Particles and Elasticity, Oscillations, Gravitation. Some industry relevant topics are also covered under which basic concepts are taught.

**Course Outcome:**

(I) The student will be able to relate different kind of waves motions.
(II) The student will be able to learn Sound and ultrasonic waves.
(III) The student will be able to learn Semiconductor phenomenon.
(IV) The student will be able to learn Electrostatics basics laws.
(V) They will be able to explain various natural vibration phenomena.
(VI) Develop basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results.
(VII) Apply the various procedures and techniques for the experiments.

| Unit | Topic | Content | Hours | Weightage |
|---|---|---|---|---|
| 1 | 1.1 | **Waves Motion & Sound & Ultrasonic Waves** | 15 | 33% |
| | | Wave motion, Transverse Wave Travelling in String, Velocity of a Wave in a String, Interference and the principle of Superposition, Standing waves on a String, Normal Modes of a String, Laws of Transverse Vibrations of a String, Melde's Experiment | | |
| | 1.2 | Speed of Sound Wave in a material medium, Speed of Sound in Gas-Newton's Formula and Laplace's Correction, Intensity and loudness of Sound Wave - Decibels, Beats, Musical Scale, Acoustics of Buildings, Application of Acoustic phenomena, Doppler Effect, Ultrasonic, Production of Ultrasonic Waves, Detection of Ultrasonic Waves, Applications of Ultrasonic waves | | |
| 2 | 2.1 | **Semiconductor Physics** | 15 | 34% |
| | | Semiconductor materials, Energy Bands in solid metals insulators and semiconductor, PN junction, Formation of PN junction, PN junction with Forward and Reverse biasing, V-I Characteristic of a PN junction diode, Zener Diode, Zener Breakdown, V-I Characteristic of a Zener diode, Zener Diode as Voltage Regulator | | |
| | 2.2 | Half-Wave Rectifier, Full-Wave Rectifier, Centre-tap Rectifier, Bridge Rectifier, Performance of Half-Wave & Full-Wave Rectifier Comparison of Rectifiers, Filter Circuit, Capacitor Filter, Inductor Filter, LC filter, π Filter, | | |
| 3 | 3.1 | **Electrostatics** | | |
| | | The Electric Field, Introduction, Coulomb's law, Continuous Charge Distribution, Electric Potential, Introduction to Potential, Comments on Potential, The Potential of a Localized charge distribution, Work and Energy in Electrostatics, The work done to move a charge, the energy of a point charge distribution<br>Current and Current density, Conservation of charge, Continuity equation, ohm's law at a point, Wiedmann and franz law, the relaxation time | 15 | 33% |

## Reference Books:


- Waves and Oscillation by N.Subrahmanym and Brij Lal Pub: Vikas Publising House Pvt. Ltd., New Delhi
- Elements of Electronics By Bagde & Singh Publisher : S.chand

- A Text Book of OPTICS By N.Subrahmanyam, Brijlal, M.N. Avadhanulu Publisher: S.chand.
- Introduction to Electrodynamics by David J. Griffiths Publisher: Prentice Hall India 3rd edition
- Electricity and Magnetism by K.K.Tiwari Pub: S.Chand & Company Ltd.
- Fundamentals of OPTICS By Gulati and Khanna Publisher: R.Chand
- Physics – Resnick and Holiday
- Principles of electronics by V.K.Mehta, S.Chand
- Electronics Device and Circuits by Allen Mottershead Pub: PHI
- Heat and Thermodynamics by Zeemansky
- Heat and Thermodynamics by A.B. Gupta and H. P. Roy ( New Central Book)


## LIST OF EXPERIMENTS

1) To determine the unknown frequency of Tuning Fork by Melde' s Experiment.
2) To Verify the Laws of vibrating strings by Melde's Experiment.
3) To study Half-Wave Rectifier.
4) To Study of a Transformer.
5) To study Characteristics of Photo diode.
6) Study of line spectra.
7) To study Bridge Rectifier
8) Find out Refractive index of prism using Spectrometer.
9) To study Zener diode Characteristics

## Reference Books:


- B.Sc. Practical physics By C.L.Arora Pub: S.chand.
- A text book of Practical Physics By Indu Prakash & Ramkrishna Pub: Kitab Mahal, New Delhi.

- Practical Physics By S.L.Gupta and V. Kumar Pub: Pragati Prakashan, Meerut.
- B.Saraf et aI-Physics through experiments Vol. I & II.

**CO-PO & CO-PSO Mapping**

| Course Outcomes | Program Outcomes 1: - Less relevant, 2: - Mild relevant, 3: - Highly relevant | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | **3** | **3** | **3** | **1** | **1** | | | **1** | | **3** | **3** |
| CO2 | **3** | **3** | **3** | | | **1** | | **1** | | **2** | **2** |
| CO3 | **3** | **3** | **3** | | **1** | | | **1** | | **2** | **3** |
| CO4 | **3** | **3** | **3** | | **1** | **1** | | **1** | **1** | **1** | **1** |
| CO5 | **2** | **2** | **2** | | **1** | **1** | **1** | **1** | **1** | **1** | **1** |
| CO6 | | | | **1** | | | | **1** | **1** | **1** | **1** |
| CO7 | | | | | **1** | **1** | | | | **1** | **1** |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Programme Code** | | **DPPHY** | | **Programme Name** | Diploma Programme of Physical Science | | | |
| **Course Code** | | DPPHY301DSC | | **Semester** | III | | | |
| **OPTICS, MODERN PHYSICS & LASER(OMPL)** | | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | Theory | Practical | Total | |
| | | | | | 3 | 1 | 4 | |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** | |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 | |

**Pre-requisite** **:** The students must have core subjects like Math's, Physics, and Chemistry in their First and second semester level.

**Rationale** **:** Knowledge of the fundamentals of Optics and Modern Physics functioning of Optical devices can assist a every human being to better communicate with optical instrument and modern physical phenomena's collaborating for the design/manufacturing of these systems

**Course Objective:**

The objective of the course to impart fundamental knowledge about some selected aspects of physics. The topics include Diffraction, Resolving power, Polarization, Laser, Modern Physics. Some industry relevant topics are also covered under which basic concepts are taught.

**Course Outcome:**

(VIII) The student will be able to understand different kind of diffraction types and its comparison between single slit and double slit grating and also understand resolving power of different optical instruments and its types.

(IX) The student understands about polarization, types of polarized light, its production method, refraction types, and about laser types, properties, applications.

(X) In this section student understand about orbital and magnetic dipole moment, different conditions of it, different laws to support this theorem.

| Unit | Topic | Content | Hours | Weightage |
|---|---|---|---|---|
| 1 | 1.1 | **Diffraction** | 15 | 34% |
| | | Distinction between Interference and diffraction (17.6), Fresnel and Fraunhoffer types of diffraction (17.7), Fraunhoffer diffraction at a double slit (18.4), Fraunhoffer diffraction at double slit (Calculus method),(18.4.1), Distinct between single slit and double slit diffraction pattern (18.4.2), Fraunhoffer diffraction at N slit (18.6 & 18.6.1), Plane diffraction grating (18.7), Theory of plane transmission grating (18.7.1), Dispersive power of Grating (18.7.7). | | |
| | 1.2 | **Resolving Power** | | |
| | | Resolving Power of Optical Instrument (19.5), Resolving Power of a telescope (19.7), Relation between magnifying power and resolving power of a telescope (19.7.1), Resolving Power of a Plane transmission grating (19.12). | | |
| 2 | 2.1 | **Polarization** | 15 | 33% |
| | | Introduction (20.1), Polarization by double refraction (20.5.5), Double refraction (20.8.3), Huygens‟ explanation of double refraction (20.9 & 20.9.1), Types of polarized light, (20.15), Retarders or Wave plates(20.17), Quarter wave plate (20.17.1), Half wave plate(20.17.2),Production of Elliptically polarized light(20.18), Detection of Elliptically polarized light(20.18.1). | | |
| | 2.2 | **Laser** | | |
| | | Introduction (6.1), Properties of Lasers (6.2), Stimulated absorption, spontaneous emission and stimulated emission (6.3), Population inversion (6.5), Pumping (6.6), Main components of a laser (6.7), Nd:YAG Laser (6.8), Helium-Neon laser (6.9), CO2 laser (6.10), Semiconductor lasers (6.11), Applications of Laser (6.12 & 6.13) | | |
| 3 | 3.1 | **Modern Physics** | 15 | 33% |
| | | Orbital and Magnetic Dipole Moment (4.1), Larmor Precession (4.2), Space quantization (4.3), Electron spin (4.4), Vector model of atom (4.5), Spectroscopic terms and their notations (4.6), Stern Gerlach Experiment (4.7), Pauli‟s Exclusion Principle (4.8). Zeeman Effect- Normal Zeeman Effect and anomalous Zeeman Effect (12.1), Explanation of Normal Zeeman Effect (12.2), | | |

| | | | | |
|---|---|---|---|---|
| | | Explanation of Anomalous Zeeman Effect (12.3), Paschan back effect (12.4). | | |

## Reference Books:


- Principles of Optics by B.K. Mathur
- Optics by Ajoy Ghatak
- Fundamentals of Optics by Jonkin‟s and White
- Engineering Physics by K. Rajgopal
- Atomic & Molecular spectra by Rajkumar Kedarnath Prakashan Meerut
- Engineering Physics by R.K Gaur and S.L. Gupta
- Concepts of Modern Physics by Arther Beiser.


**Suggested Readings:**


- A text book of OPTICS by Dr. N, Subrahmanyam, Brijlal, Dr, M,N, Avadhanulu - S.Chand
- A Text book of Light by D.N.Vasudeva - S. Chand & Co.


**Online Resources:**

1. https://en.wikipedia.org/wiki/Diffraction
2. https://testbook.com/learn/physics-diffraction-of-light/
3. https://www.olympus-lifescience.com/en/microscope-resource/primer/lightandcolor/diffraction/
4. https://byjus.com/physics/resolving-power-of-microscopes-and-telescopes/
5. https://www.britannica.com/technology/resolving-power
6. http://labman.phys.utk.edu/phys136core/modules/m9/resolving_power.html
7. https://byjus.com/physics/polarization-of-light/
8. https://www.physicsclassroom.com/class/light/Lesson-1/Polarization
9. https://en.wikipedia.org/wiki/Polarization_(waves)
10. https://www.geeksforgeeks.org/polarization-of-light-definition-types-methods-applications/
11. https://www.vedantu.com/physics/polarisation-of-light
12. https://www.edmundoptics.in/knowledge-center/application-notes/optics/introduction-to-polarization/

13. https://science.howstuffworks.com/laser-weapon.htm
14. https://www.ulsinc.com/learn
15. https://www.rp-photonics.com/lasers.html
16. https://openstax.org/books/university-physics-volume-3/pages/8-2-orbital-magnetic-dipole-moment-of-the-electron
17. https://opentextbc.ca/universityphysicsv3openstax/chapter/orbital-magnetic-dipole-moment-of-the-electron/

**Practical / Activities:**

1) Resonance pendulum. Determination of „lo", „r" & „a"
2) Study of X-ray diffraction (Powder) Pattern.
3) Decay of Temperature when body is allowed to cool. (thermocouple)
4) To study elliptically polarized light using photocell and quarter wave plate.
5) To determine ʌ using Hertzman formula
6) Activation energy of a semiconductor
7) Absorption co-efficient of liquid using photocell.

## Reference Books:

- B.Sc. Practical physics By C.L.Arora Pub: S.chand.
- A text book of Practical Physics By Indu Prakash & Ramkrishna Pub: Kitab Mahal, New Delhi.
- Practical Physics By S.L.Gupta and V. Kumar Pub: Pragati Prakashan, Meerut.
- B.Saraf et aI-Physics through experiments Vol. I & II.

**CO - PO Competency and Program Indicators (PI)**

| Course Outcomes | Program Outcomes | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | **3** | **3** | **3** | **1** | | **1** | **2** | **2** | | **1** | **1** |
| CO2 | **3** | **2** | **1** | **1** | **1** | | | **1** | | **2** | **1** |
| CO3 | **3** | **2** | **2** | | | | | | **1** | **1** | **1** |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Programme Code** | | **DPPHY** | | **Programme Name** | Diploma Programme of Physical Science | | |
| **Course Code** | | DPPHY302DSC | | **Semester** | III | | |
| **SOLID STATE, NUCLEAR & MATHEMATICAL PHYSICS(SSNM)** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | Theory | Practical | Total |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite** : The students must have core subjects like Maths, Physics, and Chemistry in their B.Sc. First year level.

**Rationale** : Clearing the concepts of atomic cohesion and crystal binding, atomic spectra, elementary particles, detectors, radioactivity, Q-Equation, Fourier series and co-Ordinator transformation can assist to better communicate for the understand about atom binding, its structure, different types of elements, and its transformation methods to understand it.

**Course Objective:**

(i) The objective of the course to impart fundamental knowledge about some selected aspects of physics. The topics include atomic cohesion and crystal binding, atomic spectra, elementary particles, detectors, radioactivity, Q-Equation, Fourier series and co-Ordinator transformation. Some industry relevant topics are also covered under which basic concepts are taught.

**Course Outcome:**

(XI) The student will be able to understand cohesion of atom, different types of bond, different crystal structure, and some properties of acting on it and also learn about its related experimental model

(XII) In this unit student will learn about elementary classification of particle, types of detectors, about radioactivity, and about the Q-equation.

(XIII) In this unit student will learn about Fourier series, application and different function of it, and also learn about co-ordinate transformation.

**Content**

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | **Atomic Cohesion and Crystal Binding:** | 1 | 30 % |
| | Cohesion of Atoms(2.1), Primary Bonds (2.2), The Covalent Bond (2.2.1), The Metallic Bond (2.2.2), The Ionic Bond (2.2.3), Mixed Bond (2.2.4), Secondary Bonds(2.3), The Vander wall's Bond (2.3.1), The Hydrogen Bond (2.3.2), The Cohesive Energy(2.4), Ionic Crystal (2.4.1), Noble Gas Crystal (2.4.2), Atomic Radi.Vs Lattice constants (2.5), Elastic constants of crystals (2.6), Elastic Stress (2.6.1), Elastic strain(2.6.2), Dilation(2.6.3), Elastic Compliance and Stiffness constant (2.7), Elastic Energy density (2.7.1), Application to Cubic crystal (2.7.2), Bulk Modulus and compressibility (2.7.3). | | |
| | **Atomic Spectra:** | | |
| | Franck-Hertz experiment, Critical potentials Shortcomings of Bohr's Theory, Summerfield extension of Bohr theory | | |
| II | **Elementary Particles** | 1 | 45 % |
| | Fundamental interactions in Nature (21.1), Dawn of elementary particle physics (21.2), Mediator of an interaction, (21.2.1), Pi-Mesons (21.2.2), Muons, Kaons and hyperons (21.2.3), Particles and antiparticles (21.3), Classifications of elementary particles (21.4) | | |
| | **Detectors:** | | |
| | Introduction (1.1.1), Detectors for Nuclear Particles (1.1.3), (i) Proportional Counter (ii) Semiconductor detectors, | | |
| | **Radioactivity:** | | |
| | (Review of Radioactive decay laws, half-life, mean life time etc.) Radioactive growth and decay (2.6) Ideal equilibrium (2.7) Transient equilibrium and secular equilibrium (2.8) Radioactive series (2.9) | | |
| | **The Q- Equation:** | | |
| | Introduction (3.1), Types of Nuclear Reactions (3.2), The Balance of Mass and Energy in Nuclear Reactions (3.3), The Q-Equation (3.4), Solution of the Q Equation (3.5). | | |
| III | **Fourier series:** | 1 | 25 % |
| | Introduction (7.1), Periodic functions (7.2), Application of Fourier series (7.3), Average values of a function (7.4), Fourier Co-efficient | | |

| | | | |
|---|---|---|---|
| | (7.5), Dirichlet's conditions (7.6), Complex form of Fourier series (7.7), Parseval Theorem | | |
| | **Co-ordinate Transformation:** | | |
| | Curvilinear Coordinates (10.6), Scale factors and basis vectors for orthogonal systems (10.7) | | |

**Reference Books:**

- Mathematical method for physical sciences by M. L. Boss John Wiley Publication.
- Concepts of Modern Physics by Arther Beiser.
- Introduction to Solid State Physics by C. Kittle (John Willey)
- Fundamental of Solid-State Physics by Saxena, Gupta, Saxena (Pragati Prakashan)
- Solid State Physics by C. M. Kachhawa
- Engineering Physics by R.K Gaur and S.L. Gupta

**Suggested Readings:**

- Elements of Solid-State Physics. (2003) by J. P. Srivastava, PHI
- Nuclear Physics by S.B. Patel (New age International (p) Ltd. Publishers)
- Modern physics by G. Aruldhas, P. Rajagopal

**Online Resources:**

18. http://www.vpscience.org/materials/US04CPHY22_UNIT4.pdf
19. https://byjus.com/physics/atomic-spectra/
20. https://www.livescience.com/65427-fundamental-elementary-particles.html
21. https://en.wikipedia.org/wiki/Particle_detector
22. https://www.sciencedirect.com/topics/physics-and-astronomy/radioactivity#:~:text=Radioactivity%20is%20the%20phenomenon%20of,mass%20being%20converted%20to%20energy.
23. https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Supplemental_Modules_(Physical_and_Theoretical_Chemistry)/Equilibria/Chemical_Equilibria/The_Reaction_Quotient#:~:text=This%20means%20that%20in%20the,there%20would%20be%20at%20equilibrium.
24. https://byjus.com/maths/fourier-series/#:~:text=A%20Fourier%20series%20is%20an,the%20sine%20and%20cosine%20functions.

25. http://motion.cs.illinois.edu/RoboticSystems/CoordinateTransformations.html
26. https://www.continuummechanics.org/coordxforms.html
27. https://math.etsu.edu/multicalc/prealpha/chap3/chap3-1/printversion.pdf

**Practical / Activities:**

## LIST OF EXPERIMENTS

10) Study of B.G.: To determine current sensitivity, volt sensitivity, figure of merit and Rg of B.G.
11) High resistance by equal deflection method.
12) Low resistance by Carry foster bridge.
13) To determine low value of „C" using Schering bridge.
14) Characteristics of UJT & Determination of RBB, VD & h
15) Characteristics of a Photodiode
16) To verify Demorgan's Theorems using IC-7400.

**CO - PO Competency and Program Indicators (PI)**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | **3** | **3** | **3** | | | **2** | **2** | | | | | |
| CO2 | **3** | **2** | **1** | **1** | | | | **2** | **1** | | | |
| CO3 | **3** | **2** | **2** | | **2** | | | **1** | | | | |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Programme Code** | | **DPPHY** | | **Programme Name** | Diploma Programme of Physical Science | | |
| **Course Code** | | DPPHY401DSC | | **Semester** | IV | | |
| **ELECTROMAGNETISM, ELECTRONICS & PLASMA PHYSICS (EMEP)** | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | **Theory** | **Practical** | **Total** |
| | | | | | 3 | 1 | 4 |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 |

**Pre-requisite** : The students must have core subjects like Maths, Physics, and Chemistry in their Higher Secondary level.

**Rationale** : Knowledge of the fundamentals of electronics and major functioning of electronic devices can assist a mechanical engineer to better communicate with electrical and electronics engineers collaborating for the design/manufacturing of these systems.

**Course Objective:**

**(ii)** The objective of the course to impart fundamental knowledge about some selected aspects of physics. The topics include Electrostatics in Dielectric, Magnetic Potentials, Magnetic Vector Potential, Magnetization, Transistors Biasing and Stabilization, Basic Transistor Amplifier and it's parameters, different Solid state Devices and Types of A.C. Bridges. Also here students learn Digital electronic and they get Number systems like Decimal, Binary, Hexadecimal and Octal and its conversions, different type subtractor. They also introduce with concept of plasma. In Plasma, study on Composition and Characteristics of a Plasma.

**Course Outcome:**

(i) The student will be able to known different kind of Magnetization, transistor biasing and different types A.C Bridge.

(ii) They Develop their basic communication skills through working in groups in performing the laboratory experiments and by interpreting the results

(iii) They also develop their basics instrumental knowledge with experiment skill and active their digital electronic calculation skill. They also get plasma related knowledge.

**Content**

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | **Electrostatics in Dielectric:** | 1 | 32 % |
| | Gaseous Non-Polar Dielectrics (2.11), Gaseous Polar Dielectrics (2.12), Non- Polar Liquids (2.13), Solid Dielectrics-Electrets (2.14). | | |
| | **Magneto statics:** | | |
| | The Magnetic Potentials (4.9- a & b), Magnetic Vector Potential due to Small Current Loop (4.12), An alternative method for finding the Vector Potential A and the Field B due to Current Loop (4.13), Magnetization (4.15), Magnetic Field Vector (4.16), Magnetic Susceptibility and Permeability (4.17), Boundary Conditions (4.18), Uniformly magnetized Sphere in External Magnetic Field (4.19), A Comparison of Static Electric and Magnetic Fields (4.20). | | |
| II | **Transistors Biasing and Stabilization:** | 1 | 33 % |
| | Bias Stabilization (Operating point stabilization) (8.7, 8.7.1 & 8.7.2), Stability factor (8.8), Stabilization by Collector Base Resistance (8.9) Stabilization by potential divider and Emitter resistor (8.10) | | |
| | **Basic Transistor Amplifier:** | | |
| | Transistor as a four pole (9.2), h-parameters with h-parameters equivalent circuit (9.5 complete), Grounded Emitter Circuit - Mathematical analysis using h parameters only (9.6), Comparative Study of three types of Amplifiers (9.9). | | |
| | **Solid state Devices:** | | |
| | JFET (12.1 to 12.6), UJT (26.6, 26.6.1 to 26.6.3). | | |
| | **A.C. Bridges:** | | |
| | A.C. Bridges (17.5), Maxwell Bridge (17.6.1), Schering Bridge. | | |
| III | **Digital Electronics:** | 1 | 35 % |
| | Introduction (21.1), Number systems used in Digital Electronics (21.2), Decimal, Binary, Hexadecimal and Octal (21.2.1 to 21.2.4), Binary Codes-(A) BCD, (B) Gray, (C) Excess-3 Codes (21.4), Arithmetic Circuits – Exclusive - OR Gate (21.9), Applications of X-OR Gate: (i) Binary to Gray Code Converter (ii) A Parity Checker (iii) The Half Adder (iv) The Full Adder (v) Parallel Adder (vi)Half subtractor (vii)Full subtractor. | | |
| | **The Basic concepts of Plasma:** | | |

| | | | |
|---|---|---|---|
| | Introduction (1.1), Composition and Characteristics of a Plasma (1.2), Collisions (1.3), Elastic collisions (1.3.1), Inelastic collisions (1.3.2), Surface Phenomena (1.4), Transport Phenomena (1.5), Diffusion and Mobility (1.6), Viscosity, Conductivity (1.7), Recombination (1.8), Ohm"s law (1.9), Gas Discharge (1.10), Composition of various natural and Man-made Plasma (1.11), Plasma diagnostics (1.12), Plasma waves and Instabilities Confinement of Plasma (1.13), Space Plasma (1.14). | | |

**Reference Books:**


- Electromagnetic by B.B. Laud, New Age Int. Publisher
- Hand book of Electronics by Gupta & Kumar 30th Revised Edition,2002 Pragati Prakashan
- Electronics and Radio Engineering by M.L. Gupta ($9^{th}$ Edition-2002) D Raj & Sons
- Electricity and Magnetism by Maharajan and Rangwala, THM
- Electronic Devices and Circuits by A.Mottershead Prentice – Hall of India.
- Basic Electronics and Linear Circuits by N.N.Bhargava, D.C.Kulshreshtha, S.C.Gupta McGraw
- Electricity and Magnetism Berkeley Physics course Vol.-II by EDWARD M PURCELL.
- Integrated Electronics by Millman & Halkias.


**Suggested Readings:**


- Electricity and Magnetism By K.K.Tewari (S.Chand.& Company Ltd.)
- Elements of Plasma Physics by S.N.Goswami New Central book Agency (P) Ltd., Calcutta.
- Advanced Magneto hydrodynamics by J. P. Goedbloed; Rony Keppens; Stefaan Poedts.
- Plasma Physics An Introduction By Richard Fitzpatrick

**Online Resources:**

- https://www.electronics-tutorials.ws/
- www.youtube.com
- https://www.britannica.com/science/plasma-state-of-matter/Plasma-oscillations-and-parameters
- http://silas.psfc.mit.edu/introplasma/

**Practical / Activities:**

1. Coaxial Viscometer
2. To determine wave length of bright lines of mercury light using grating.
3. R.P. of Telescope
4. Searl's Goneometer. Determination of cardinal points and do
5. Kundt's tube. Determination of "y"
6. Diffraction by Adser 'A' Pattern
7. e/k by Power Transistor

## Reference Books:


- B.Sc. Practical physics By C.L.Arora Pub: S.chand.
- A text book of Practical Physics By Indu Prakash & Ramkrishna Pub: Kitab Mahal, New Delhi.
- Practical Physics By S.L.Gupta and V. Kumar Pub: Pragati Prakashan, Meerut.
- B.Saraf et aI-Physics through experiments Vol. I & II.


**CO - PO Competency and Program Indicators (PI)**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | **3** | **3** | **3** | | **1** | | | | **2** | | | |
| CO2 | **2** | **2** | **1** | **1** | | | **1** | **1** | | | | |
| CO3 | **2** | **1** | **1** | | | **1** | | | | | | |

| GOKUL GLOBAL UNIVERSITY, SIDHPUR | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Programme Code** | | **DPPHY** | | **Programme Name** | Diploma Programme of Physical Science | | | |
| **Course Code** | | DPPHY402DSC | | **Semester** | IV | | | |
| **QUANTUM MECHANICS, SOLID STATE & THERMODYNAMICS (QMSST)** | | | | | | | | |
| **Course type:** | | Discipline Specific Course | | **Total Credit:** | **Theory** | **Practical** | **Total** | |
| | | | | | 3 | 1 | 4 | |
| **Teaching time (hours)** | | **Examination Marking scheme** | | | | | | |
| **Theory** (hrs.) | **Practical** (hrs.) | **Internal** (Marks) | | **External** (Marks) | **Total** (Marks) | | | |
| | | **Theory** | **Practical** | **Theory** | **Theory** | **Practical** | **Total** | |
| 3 X 15 = 45 | 15X2=30 | 25 | 25 | 50 | 75 | 25 | 100 | |

**Pre-requisite** : The students must have core subjects like Maths, Physics, and Chemistry in their Higher Secondary level.

**Rationale** : Knowledge of the fundamentals of electronics and major functioning of electronic devices can assist a mechanical engineer to better communicate with electrical and electronics engineers collaborating for the design/manufacturing of these systems.

**Course Objective:**

(iii) The objective of the course to impart fundamental knowledge about some selected topics of physics. The topics include Schrodinger Equations, The operator correspondence and the Schrodinger equation for a particle subject to forces , Normalization and Probability Interpretation, Non-Normalizable Wave functions and Box Normalization, Conservation of Probability, Crystal Structure, Some importance crystal structure, Face Centered Cubic Structure, Wigner-Seitz Cells, Miller Indices , Newtonian Relativity, Relativity of Simultaneity, Heat and Thermodynamics, The Helmholtz and Gibb's function, Maxwell's Distribution Law of Velocities Some industry relevant topics are also covered under which basic concepts are taught.

**Course Outcome:**

(XIV) The student will be able to relate different kind of Schrodinger Equation. They will be able to explain various Normalization and Probability.

(XV) Develop basic structure knowing skills through working in groups in performing the laboratory experiments and by interpreting the results.

(XVI) They learn different types of Relativity concept, Thermodynamics.

**Content**

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | **1.1.Schrodinger Equations:** | 1 | 32 % |
| | A free particle in one dimension (2.1), Generalization to three dimensions (2.2), The operator correspondence and the Schrodinger equation for a particle subject to forces (2.3), Normalization and Probability Interpretation (2.4), Non-Normalizable Wave functions and Box Normalization (2.5). | | |
| | **1.2.Physical Interpretation and Condition on '$\psi$ ':** | | |
| | Conservation of Probability (2.6), Expectation values, Ehrenfest"s Theorem (2.7), Admissibility Condition on the Wave function (2.8) | | |
| | **1.3.Stationary States and Energy Spectra** | | |
| | Stationary states: The time Independent Schrödinger Equation (2.9), A particle in a square well potential (2.10), Bound States in a square well (E > 0) (2.11), The square well: Non-localized states (E > 0) (2.12). | | |
| II | **2.1. Crystal Structure:** | 1 | 33 % |
| | Structure, Translational Symmetry, Space, Unit Cell and Primitive Cell, Symmetry Elements in Crystals, The Seven crystal Systems, Coordination Number, some importance crystal structure, Simple Cubic Structure, Body Centered Cubic Structure, Face Centered Cubic Structure, Wigner-Seitz Cells, Miller Indices, The spacing of a set of crystal planes. | | |
| | **2.2. Special Theory of Relativity:** | | |
| | Newtonian Relativity (14.1), Michelson-Morley experiment (14.2), Special theory of relativity (14.3), Lorentz Transformation (14.4), Consequences of Lorentz Transformation (14.5)-(a) Relativity of Simultaneity (b) the Lorentz-Fitz Gerald length Contraction (c) Time Dilation, Addition of Velocities (14.6), Mass-energy relation (14.8), Space time (14.9), Compton scattering (14.11). | | |
| III | **3.1. Heat and Thermodynamics:** | 1 | 35 % |
| | Characteristic functions, Enthalpy, The Helmholtz and Gibb's function, Two Mathematical Theorems, Maxwell's equations, The T-ds equations, Energy equation, The Thermal Expansivity, Compressibility, Joule-Kelvin effect (Porous plug Experiment), Liquefaction of Gases by Joule-Kelvin effect. | | |
| | **3.2. Kinetic Theory of Gases:** | | |

| | | | |
|---|---|---|---|
| | Maxwell's Distribution Law of Velocities, Deduction of Maxwell–Boltzmann law, Determination of the values of constants 'a' and 'b', Experimental Test of Maxwell's Law. | | |

**Reference Books:**

- Elements of Solid-State Physics. (2003) by J. P. Srivastava, PHI
- Nuclear Physics by S.B. Patel (New age International (p) Ltd. Publishers)
- Mathematical method for physical sciences by M. L. Boss John Wiley Publication.
- Concepts of Modern Physics by ArtherBeiser.
- Introduction to Solid State Physics By C.Kittle (John Willey)
- Fundamental of Solid State Physics By Saxena, Gupta, Saxena (PragatiPrakashan)
- Solid State Physics by C. M. Kachhawa
- Engineering Physics by R.K Gaur and S.L. Gupta

**Suggested Readings:**

- Modern physics by G. Aruldhas, P. Rajagopal
- Nuclear Physics in a Nutshell by Carlos A. Bertulani
- Nuclear Physics: Principles and Applications by John Lilley
- Fundamentals of Physics (Mechanics, Relativity, and Thermodynamics) by R. Shankar
- Heat and Thermodynamics by Pramila Shukla , Shefali Kanwar & Shivani
- An Introduction to the Kinetic Theory of Gases by James Jeans.

**Online Resources:**

- www.youtube.com
- https://en.wikipedia.org/
- https://galileo.phys.virginia.edu/classes/252/home.html

**Practical / Activities:**

1) Absolute value of capacity using B.G. or S.G.
2) Low resistance by method of Projection
3) Comparison of capacity (C1/C2) by Desauty method
4) To determine self-inductance by Anderson Bridge

5) Characteristics of a C.B. Transistor (PNP)
6) Characteristics of JFET & Determination of μ, rd, gm
7) Construction of AND, OR, NOT Gates using NAND & NOR Universal gates.

**CO - PO Competency and Program Indicators (PI)**

| Course Outcomes | Program Outcomes | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | **3** | **3** | **3** | | **1** | | | | **2** | | | |
| CO2 | **2** | **1** | **2** | **1** | | **2** | | **2** | | | | |
| CO3 | **1** | **2** | **1** | | | | **2** | | **1** | | | |

GOKUL GLOBAL UNIVERSITY

Approved By Govt. of Gujarat
(Recognized by UGC under Section 22 & 2(f) of 1956)
(Gujarat Private State University Act 4 of 2018)

# COURSE STRUCTURE

## Bachelor of Science

## Microbiology

## Under

## National Education Policy (NEP-2020)

Faculty of Science
Gokul Science College
University Campus, State Highway-41,
**Siddhpur** - 384151, **Dist.** Patan, Gujarat, INDIA, **Mobile :** 9510973863
**E- Mail :** dean.fac.sci@gokuluniversity.ac.in, **Website :** www.gokuluniversity.ac.in

| PO No. | Program Outcome Description |
|---|---|
| PO1 | Foundational Knowledge: Graduates will possess a strong foundation in the fundamental concepts,theories, and principles of their chosen discipline, as per the prescribed curriculum. |
| PO2 | Practical Skills: Students will acquire practical skills relevant to their field, including laboratorytechniques, data collection, analysis, and interpretation. |
| PO3 | Critical Thinking: Graduates will develop critical thinking skills to analyze, evaluate, and solvescientific problems, applying logical reasoning and evidence-based approaches. |
| PO4 | Effective Communication: Students will demonstrate effective communication skills, both orally andin writing, to convey scientific ideas and findings to different audiences. |
| PO5 | Collaboration and Teamwork: Graduates will work collaboratively in teams, engaging in effectivecommunication, cooperation, and coordination to accomplish shared objectives. |
| PO6 | Information Literacy: Students will develop information literacy skills to access, evaluate, and utilizescientific information from diverse sources, including digital resources. |
| PO7 | Ethical Awareness: Graduates will demonstrate ethical awareness and responsibility in scientificpractice, understanding the importance of integrity, honesty, and ethical conduct. |
| PO8 | Lifelong Learning: Students will develop a commitment to lifelong learning, staying updated withadvancements in their field and engaging in continuous professional development. |
| PO9 | Societal Impact: Graduates will recognize the social and ethical implications of scientific knowledgeand contribute positively to society through their discipline. |

| PSO No. | Program Specific Outcome Description |
|---|---|
| PSO1 | Microbiological Proficiency: Graduates of the B.Sc. Microbiology program will acquire in-depth knowledge of microorganisms, their structure, physiology, and genetics. They will demonstrate proficiency in microbiological techniques, including isolation, identification, and characterization ofmicroorganisms. |
| PSO2 | Applied Microbiology and Research Skills: Graduates will apply their knowledge of microbiology to solve practical problems in various sectors such as healthcare, agriculture, and environmental management. They will possess research skills to investigate microbial processes, conduct experiments, and analyze and interpret microbial data. |

GOKUL GLOBAL UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF MICROBIOLOGY

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Certificate | UG | I | Discipline Specific Course (Major-1) | CPMIC101 DSC | Introduction to microbial world | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | CPBOT101 DSC | Introduction of plant world | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Minor) | CPCHE101 DSC/CPZOO101DSC | General Chemistry-I/non chordates i – protista to psedocoelomates | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi Disciplinary Course | CP101MDC | Basics of computer application | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancment Course | CP101AEC | Communication Skills-1 | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Indian Knowledge System | CP101IKS | Indian Constitution | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancment Course | CP101SE | Photography Basics | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

**GOKUL GLOBAL UNIVERSITYFACULTY OF SCIENCEDEPARTMENT OF MICROBIOLOGY**

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | Credit | Max. Marks | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Certificate | UG | II | Discipline Specific Course (Major-1) | CPMIC201DSC | Systematic bacteriology | 45 | 4 | 30 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | CPBOT201DSC | Morphology and tissue system in plants | 45 | 4 | 30 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Minor) | CPCHE201DSC/ CPZOO201DSC | General chemistry-ii/ non-chordates ii coelomates | 45 | 4 | 30 | 50 | 50 | 100 |
| 4 | | | | Multi Disciplinary Course | CP201MDC | Basic Statistics | 45 | 4 | 30 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancment Course | CP201AEC | Communication Skills-2 | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Value added Course-I | CP201VAC | Fundamentals of Nutrition | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancment Course | CP201SE | Cyber Security | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

GOKUL GLOBAL UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF MICROBIOLOGY

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Diploma | UG | III | Discipline Specific Course (Major-1) | DPMIC301DSC | MICROBIAL PHYSIOLOGY AND METABOLISM | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | DPMIC302DSC | SOIL AND WATER MICROBIOLOGY | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Major-3) | DPBOT301DSC | MYCOLOGY AND PHYTOPATHOLOGY | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Multi Disciplinary Course | DP301MDC | ARTIFICIAL INTELLIGENCE(AI) :-Knowledge Representation and Reasoning | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | DP301AEC | CREATIVE WRITING ESSENTIAL | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Indian Knowledge System | DP301IKS | YOGA | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | DP301SEC | PRESENTATION SKILLS | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

GOKUL GLOBAL UNIVERSITY
FACULTY OF SCIENCE
DEPARTMENT OF MICROBIOLOGY

| Sr. No. | Course | Level | Semester | Course Type | Course Code | Course Name | Duration in Hrs. | | Credit | Max. Marks | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Theory | Practical | | CCE(Formative) (weekly test/ Assignment/ Attendance/ Practical/ Viva/ Group Discussion/ Quiz) | SEE (Summative) | |
| 1 | Diploma | UG | IV | Discipline Specific Course (Major-1) | DPMIC401DSC | MICROBIAL BIODIVERSITY | 45 | 30 | 4 | 50 | 50 | 100 |
| 2 | | | | Discipline Specific Course (Major-2) | DPMIC402DSC | FOOD AND DAIRY MICROBIOLOGY | 45 | 30 | 4 | 50 | 50 | 100 |
| 3 | | | | Discipline Specific Course (Major-3) | DPBOT401DSC | ANATOMY OF ANGIOSPERMS | 45 | 30 | 4 | 50 | 50 | 100 |
| 4 | | | | Discipline Specific Course (Minor) | DPCHE401DSC | | 45 | 30 | 4 | 50 | 50 | 100 |
| 5 | | | | Ability Enhancement Course | DP401AEC | PERSONALITY DEVELOPMENT | 30 | --- | 2 | 25 | 25 | 50 |
| 6 | | | | Value added Course-I | DP401VAC | SPORTS AND FITNESS | 30 | --- | 2 | 25 | 25 | 50 |
| 7 | | | | Skill Enhancement Course | DP401SEC | STRESS MANAGEMENT | 30 | --- | 2 | 25 | 25 | 50 |
| Total | | | | | | | 270 | 120 | 22 | 275 | 275 | 550 |

<table>
<tr><th colspan="8">GOKUL GLOBAL UNIVERSITY, SIDHPUR</th></tr>
<tr><td colspan="2">Programme Code:</td><td colspan="2">CPMIC</td><td colspan="2">Programme Name:</td><td colspan="2">Certificate Programme of Microbiology</td></tr>
<tr><td colspan="2">Course Code:</td><td colspan="2">CPMIC101DSC</td><td colspan="2">Semester:</td><td colspan="2">I</td></tr>
<tr><th colspan="8">INTRODUCTION TO MICROBIAL WORLD</th></tr>
<tr><td colspan="2" rowspan="2">Course type:</td><td colspan="2" rowspan="2">Discipline Specific Course</td><td colspan="2" rowspan="2">Total Credit:</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>03</td><td>01</td><td>04</td></tr>
<tr><td colspan="2">Teaching time (hours)</td><td colspan="6">Examination Marking scheme</td></tr>
<tr><td>Theory (hrs.)</td><td>Practical (hrs.)</td><td colspan="2">Internal (Marks)</td><td>External (Marks)</td><td colspan="3">Total (Marks)</td></tr>
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**Pre-requisite:** Having Passed 12th Science in Biology.

**Rationale :** Microorganisms contribute to the world in myriads of ways**.** They have immense importance in our ecosystem and health system. Some of these are explained below.

1. Agriculture: microbes help plants take required nutrients by breaking down complex compounds into simple form. They also make the soil rich in nutrients and minerals that enhance crop yield.
2. Food processing: The study of microbiology has enlightened us on the application of microbes as an essential source of nutrients. For example, some algal and fungal species are part of people's meal such as mushroom, spirulina.

**Course Objectives:** To complement the students with the basic knowledge about history and scope of microbiology, general characteristics of microorganisms, various microscopic techniques, physical and chemical microbial control.

**Course Outcomes:** After successfully completion of the course, the student will be able to

(i) Demonstrate theory in microscopy and their handling techniques and staining procedure.
(ii) Know Various characteristics of microorganisms and also understand various physical and chemical means of sterilization.

(iii) Students will gain knowledge about the Binomial nomenclature, Whittaker's five kingdom classification system.

(iv) Students will also study the Prokaryotic and eukaryotic classification, Spontaneous generation verses biogenesis & germ theory of diseases.

(v) Students will also study the Contribution of various scientists in microbiology.

| Unit | Topic | Content | Hrs. | Weightage |
|---|---|---|---|---|
| 1 | | **Introduction, history and scope of Microbiology** | 15 | 33% |
| | 1.1 | Microbiology as a field of Biology. Golden era of microbiology | | |
| | 1.2 | Binomial Nomenclature, Haeckel's Three Kingdom and Whittaker's five Kingdom classification, Prokaryotic and Eukaryotic classification. | | |
| | 1.3 | Group of microorganisms (Acellular and cellular microorganisms) | | |
| | 1.4 | Spontaneous generation Versus biogenesis, Germ theory of disease. | | |
| | 1.5 | Development of various microbiological techniques and contribution of Anton Von Leeuwenhoek, Louis Pasture, Robert Koch, Joseph Lister, Alexander flaming, Selman A. Waksman, Sergei N. Winogradsky, Paul Ehrlich, Edward Jenner, Elie Metchnikoff… | | |
| 2 | | **General Characteristics of Microorganisms** | 15 | 33% |
| | 2.1 | Characteristics of Microorganisms: Morphological, Chemical, Cultural, Metabolic, Antigenic, Genetic, Phylogenetic and Ecological. | | |
| | 2.2 | Microbial Identification, Classification and Nomenclature. | | |
| | 2.3 | General characteristics, occurrence, structure, reproduction and importance of protozoa. | | |
| | 2.4 | General characteristics, occurrence, structure, reproduction and importance of fungi. | | |
| | 2.5 | General characteristics, occurrence, structure, reproduction and importance of virus. | | |
| | | **Microbial Techniques and Sterilization techniques** | | |
| | 3.1 | Microscopy**:** Bright field microscopy, Dark field Microscopy, Phase Contrast Microscopy | | |
| | 3.2 | Fluorescence microscopy, Transmission electron microscopy, Scanning Electron Microscopy | | |
| | 3.3 | Principles, construction and application of centrifuge; bacteriological Incubator & Incubator Shaker; Spectrophotometer (UV-Vis), Laminar flow; Colorimeter. | | |

| | | | | |
|---|---|---|---|---|
| | 3.4 | Definitions of terms- sterilization and disinfection; Sterilization by Physical methods- Use of moist heat- heat under pressure, autoclave, boiling, pasteurization, | | |
| | 3.5 | Fractional sterilization; Use of dry heat- hot air oven, incineration; Filtration- Seitz filter, membrane filter, HEPA filter; Radiation- Ionizing and non- ionizing; | | |
| | 3.6 | Chemical methods- Alcohols, aldehydes, phenols, halogens, metallic salts, ethylene oxide. | | |

**Reference Books**

1. Prescott's Microbiology by Joanne Willey and Linda Sherwood
2. Brock Biology of Microorganisms, by Michael T. Madigan and John M. Martinko
3. Microbiology: A Systems Approach by Marjorie Kelly Cowan
4. Foundations in Microbiology by Kathleen Park Talaro and Barry Chess
5. Microbiology by Pelczar, Jr., Michael
6. Microbiology by Jacquelyn G. Black
7. A Textbook of Microbiology by Dubey R.C. and Maheshwari D.K.

## LIST OF EXPERIMENTS

1. Safety precautions to work in microbiology laboratory.
2. To study the principle and application of important instruments (autoclave, incubator, hot air oven, pH meter) used in microbiology laboratory.
3. To study the principle and application of important instruments (biological safetycabinets, centrifuge, Spectrophotometer, Colorimeter) used in microbiology laboratory.
4. Introduction of light microscope & its handling.
5. Preparation of culture media for bacterial cultivation.
6. Morphological & cultural characteristics of bacteria.
7. Sterilization of medium using Autoclave and assessment for sterility.
8. Sterilization of glassware using Hot Air Oven and assessment for sterility.
9. Sterilization of heat sensitive material by membrane filtration and assessment

forsterility.

10. Study of Rhizopus using temporary mounts.
11. Study of Penicillium using temporary mounts.
12. Study of Aspergillus using temporary mounts.
13. Study of Spirogyra and Chlamydomonas, Volvox using temporary mounts.
14. Study of the following protozoans using permanent mounts/photograph:Amoeba, Paramecium and plasmodium.
15. Isolation and Cultivation of fungi.

**CO-PO & CO-PSO Mapping**

| Course Outcomes | Program Outcomes/ Program Specific Outcomes (1-Less Relevant, 2- Mild Relevant, 3-Highly Relevant) | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | 2 | 1 | - | 2 | 1 | - | 2 | - | 2 | 2 |
| CO2 | 2 | 2 | 1 | - | 2 | 1 | - | 2 | - | 2 | 1 |
| CO3 | 2 | 2 | 1 | - | 2 | 1 | - | 2 | - | 2 | 1 |
| CO4 | 3 | - | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 |
| CO5 | 2 | 1 | 1 | - | 2 | 1 | - | 3 | - | 2 | 1 |

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<tr><td colspan="2">Course Code:</td><td colspan="2">CPMIC201DSC</td><td colspan="2">Semester:</td><td colspan="2">II</td></tr>
<tr><th colspan="8">SYSTEMATIC BACTERIOLOGY</th></tr>
<tr><td colspan="2" rowspan="2">Course type:</td><td colspan="2" rowspan="2">Discipline Specific Course</td><td colspan="2" rowspan="2">Total Credit:</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
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**Pre-requisite:** Having Passed 1st semester of B.Sc. in Microbiology.

**Rationale :** Measuring a bacterial culture's growth rate can inform about their physiological and metabolic functions and useful for obtaining an accurate cell number of the bacteria for downstream applications. The laboratory techniques are very important for pure culture isolation.

**Course Objectives:** To complement the students with the basic knowledge about bacterial cell organization, Bacterial reproduction, pure culture isolation and preservation, microbial nutrients, various staining methods.

**Course Outcomes:** At the end of the course, students shall be able to

(i) Students will gain knowledge about bacterial cell size, shape, arrangement, detail structure of flagella, pilli, cell wall, cell membrane.
(ii) Students will gain knowledge about sexual and asexual bacterial reproduction, Bacterial Growth curve, Different types of culture media.
(iii) Demonstrate theory in laboratory and their handling techniques and staining procedure.
(iv) Students will also study the types of plasmids, chromosome & stages of sporulation.
(v) Students will gain the knowledge about bacterial classification based on their nutritional requirement & methods used for preservation of bacterial culture.

| Unit | Topic | Content | Hrs | Weightage |
|---|---|---|---|---|
| 1 | | **Bacterial cell Organization** | 15 | 33.3% |
| | 1.1 | Bacterial cell size, Shape and Arrangement. | | |
| | 1.2 | Composition and details structure of Flagella, Fimbriae and Pili, Capsule. | | |
| | 1.3 | Structure & function and chemical composition of bacterial and archaeal: Cell Wall and Cell Membrane | | |
| | 1.4 | Cytoplasm: Ribosome, Mesosomes, Inclusion Body, Nucleoid, Chromosome and Plasmid. | | |
| | 1.5 | Spore: Structure, Formation, and Stage of sporulation. | | |
| 2 | | **Bacterial Reproduction and Pure Culture Isolation** | 15 | 33.3% |
| | 2.1 | Types of Reproduction methods in bacteria | | |
| | 2.2 | Logarithmicrepresentationofbacterialpopulationandphaseofbacterialgrowth, Calculation of time and specific growth rate, Factors affecting microbial growth. | | |
| | 2.3 | Introduction to term: Pure culture, Mix culture, Microbial strain, Microbial colony | | |
| | 2.4 | Isolation of microorganisms; Serial Dilution method, Enrichment method | | |
| | 2.5 | Methods for enumeration & isolation of microorganisms using pour plate, spread plate technique, and streak plate method | | |
| 3 | | **Microbial Nutrient and Staining method** | 15 | 33.3% |
| | 3.1 | Bacterial nutrition requirement and categorization. | | |
| | 3.2 | Introduction to culture media. | | |
| | 3.3 | Different types of microbial culture media. | | |
| | 3.4 | Staining techniques, principles, procedures and applications of Simple staining, negative staining; Differential staining- Gram's staining, acid fast staining, Leishman's staining, Giemsa's staining, Ziehl-Neelsen staining; Structural staining- cell wall, capsule, endospore and flagella staining. | | |

**ReferenceBooks**

1. Prescott's Microbiology by Joanne Willey and Linda Sherwood
2. Brock Biology of Microorganisms by Michael T. Madigan and John M. Martinko
3. Microbiology: A Systems Approach by Marjorie Kelly Cowan
4. Foundations in Microbiology by Kathleen Park Talaroan BarryChess
5. Microbiology by Pelczar, Jr., Michael
6. Microbiology by Jacquelyn G. Black
7. A Textbook of Microbiology by Dubey R.C. and Maheshwari D.K.

- A text book of Practical Physics By Indu Prakash & Ramkrishna Pub: Kitab Mahal, New Delhi.
- Practical Physics By S.L.Gupta and V. Kumar Pub: Pragati Prakashan, Meerut.
- B.Saraf et aI-Physics through experiments Vol. I & II.

## LIST OF EXPERIMENTS

1. Simple staining
2. Negative staining
3. Gram's staining
4. Acid fast staining- permanent slide only
5. Capsule staining
6. Endospore staining
7. Preparation of differential media
8. Isolation of pure cultures of bacteria by streaking method.
9. Preservation of bacterial cultures by various techniques.

10. Motility by hanging drop method.
11. Estimation of CFU count by spread plate method.
12. Cell wall staining: Ringer's method and Dayr’s method.
13. Flagella staining: Leifson’s method and Loeffler's method.
14. Isolation of microorganisms: Serial dilution method.
15. Estimation of CFU count by Pour plate method.

**CO-PO & CO-PSO Mapping**

| **Course Outcomes** | **Program Outcomes 1: Less relevant, 2: Mild relevant, 3: Highly relevant** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | 2 | 2 | - | 1 | - | - | 2 | 2 | 3 | 1 |
| CO2 | 2 | - | 1 | 1 | 2 | 1 | - | 2 | 1 | 2 | 1 |
| CO3 | 3 | 2 | 1 | - | 1 | 2 | - | 3 | 2 | 3 | 2 |
| CO4 | 2 | - | 1 | - | 2 | 1 | - | 2 | 1 | 2 | 2 |
| CO5 | 3 | 2 | 1 | 1 | 2 | 1 | - | 2 | 1 | 2 | 1 |

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<tr><td colspan="8">GOKUL GLOBAL UNIVERSITY, SIDHPUR</td></tr>
<tr><td colspan="2">Programme Code:</td><td colspan="2">DPMIC</td><td colspan="2">Programme Name:</td><td colspan="2">Diploma Programme of Microbiology</td></tr>
<tr><td colspan="2">Course Code:</td><td colspan="2">DPMIC301DSC</td><td colspan="2">Semester:</td><td colspan="2">III</td></tr>
<tr><td colspan="8">MICROBIAL PHYSIOLOGY AND METABOLISM</td></tr>
<tr><td colspan="2" rowspan="2">Course type:</td><td colspan="2" rowspan="2">Discipline Specific Course</td><td colspan="2" rowspan="2">Total Credit:</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
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**Pre-requisite:** Having Passed 2nd semester of B.Sc. in Microbiology.

**Rationale :** Microbial physiology has traditionally played a very important role in both fundamental research and in industrial applications of microorganisms. The classical approach in microbial physiology has been to analyze the role of individual components (proteins, enzymes & genes) in over all cell function. It provides information on source of energy and its utilization by microorganisms.

**Course Objectives:** To understand the knowledge about Enzymes, co factors, apo enzyme, Microbial growth, Aerobic respiration and fermentation.

**Course Outcomes:** At the end of the course, students shall be able to

(i) Students will identify and describe the components of an enzyme, including the prosthetic group, apoenzyme, coenzyme, and cofactors and able to explain how these components contribute to the enzyme's structure and function.
(ii) Students will Gain a foundational understanding of the ingredients and chemical compositions necessary to create effective culture media and learn how various

components such as nutrients, growth factors, buffers, and indicators are used in media formulations.

(iii) Students will gain a thorough understanding of the basic concepts and principles underlying chemotherapy, including its historical development, key scientific breakthroughs, and the overarching strategies used in the treatment of infectious diseases through chemotherapeutic agents.

(iv) Students will gain knowledge of competitive, non-competitive inhibition of enzyme, Media formulation, Enzyme classification, Chemotherapy.

(v) Students will also study EMP, TCA, Pentose Phosphate pathway, Alcohol fermentation, lactate fermentation, Importance of carbohydrates, proteins, lipids, nucleic acid.

| Unit | Topic | Content | Hrs | Weightage |
|---|---|---|---|---|
| 1 | | **ENZYMES** | 15 | 33.3% |
| | **1.1** | General introduction : Physical and chemical properties, Structure of enzymes: prosthetic group, apoenzyme, coenzyme, cofactors. | | |
| | **1.2** | Localization of enzymes : Extra cellular and intra cellular, Nomenclature and classification of enzymes, IUB system of enzyme classification. | | |
| | **1.3** | Enzyme action: active sites of enzyme, Mechanism of enzyme action. | | |
| | **1.4** | Factors affecting enzyme activity, Inhibition of enzyme activity: Competitive and noncompetitive. | | |
| 2 | | **MICROBIAL NUTRITION AND GROWTH** | 15 | 33.3% |
| | **2.1** | Nutritional categories of microorganisms: carbon, Energy and electron donor source. | | |
| | **2.2** | Culture media: principles of media formulations. Types of media : Routine and specialized media, selective media, differential media, Enriched and Enrichment media, Assay media. | | |
| | **2.3** | Methods of reproduction in bacteria and new cell formation. | | |
| | **2.4** | Principles of chemotherapy and general mode of action ofvarious chemotherapeutic agent: Sulphonamides, antibiotics and semi synthetic antibiotics. | | |

| | | | | |
|---|---|---|---|---|
| 3 | | **BIOMOLECULES AND METABOLISM** | 15 | 33.3% |
| | **3.1** | Biomolecules: Chemical structure, properties, classification, and biological significance of Carbohydrate, Proteins, lipid and nucleic acids. Introduction to modes of microbial metabolism: Anabolism, catabolism, primary and secondary metabolism. | | |
| | **3.2** | Concept of aerobic respiration, and fermentation sugar degradation pathways i.e. EMP, ED, pentose phosphate pathway, TCA cycle. Electron transport chain, Gluconeogenesis, cori cycle | | |
| | **3.3** | Anaerobic respiration : Anaerobic respiration with special reference to dissimilatory nitrate reduction, Anaerobic fermentation: Alcohol fermentation and Pasteur effect, Lactate fermentation. | | |

**Reference Books**

1. Microbiology by Pelczar, Jr., Michael
2. General Microbiology stainer R.Y , ingram, Eheelies, M.L. painter, Mac Million India.
3. Introduction to microbiology, J.L, ingram and C.A. Ingram
4. Microbiology, J.G. Black, Edition 5th
5. Biochemistry by U.Satynarayan.

## LIST OF EXPERIMENTS

1) **Qualitative analysis of biomolecules**: Carbohydrates: Iodine test, Molisch's test, Benedict's test, Barfoed test, Bial's testand Saliwanoff's test.
2) **Qualitative analysis of biomolecules**: Proteins: Biurate test, Ehrlich"s test, Glyoxilic acid test, Xanthoproteic test
3) Determination of absorption maxima of a colored solution (use methylene blue).

4) **Study biochemical reaction of bacteria**: **Based on carbon source.**
   i. Oxidative and fermentative breakdown of glucose.
   ii. Fermentation of sugars and sugar alcohol: glucose, xylose, mannitol, lactose,maltose and sucrose.
   iii. Glucose breakdown product: Methyl red test.
   iv. Citrate utilization test.
   v. Starch utilization test.
   vi. Lipid utilization test.

5) **Study biochemical reaction of bacteria**: **Based on nitrogen source.**
   i. Indole production test.
   ii. H2S production test.
   iii. Urea utilization test.
   iv. Casein hydrolysis test.
   v. Gelatin hydrolysis test.
   vi. Deamination test.

6) **Study biochemical reaction of bacteria**: **Other tests.**
   i. Catalase test.
   ii. Dehydrogenase test.
   iii. Oxidase test.

**CO-PO & CO-PSO Mapping**

| Course Outcomes | Program Outcomes 1: Less relevant, 2: Mild relevant, 3: Highly relevant | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | - | 1 | - | 2 | 1 | - | 2 | - | 2 | - |
| CO2 | 2 | - | - | 1 | 2 | - | - | 2 | 1 | 2 | 1 |
| CO3 | 3 | 2 | 1 | 1 | 2 | 2 | - | 3 | 2 | 3 | 2 |
| CO4 | 2 | 1 | 1 | 1 | 2 | - | - | 2 | - | 2 | 2 |
| CO5 | 2 | 2 | 1 | 1 | 2 | 1 | - | 2 | 1 | 2 | 2 |

<table>
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<tr><td colspan="2">Programme Code:</td><td colspan="2">DPMIC</td><td colspan="2">Programme Name:</td><td colspan="2">Diploma Programme of Microbiology</td></tr>
<tr><td colspan="2">Course Code:</td><td colspan="2">DPMIC302DSC</td><td colspan="2">Semester:</td><td colspan="2">III</td></tr>
<tr><td colspan="8">SOIL AND WATER MICROBIOLOGY</td></tr>
<tr><td colspan="2" rowspan="2">Course type:</td><td colspan="2" rowspan="2">Discipline Specific Course</td><td colspan="2" rowspan="2">Total Credit:</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
<tr><td>03</td><td>01</td><td>04</td></tr>
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<tr><td>25</td><td>25</td><td>50</td><td>75</td><td>25</td><td>100</td></tr>
</table>

**Pre-requisite:** Having Passed 2nd semester of B.Sc. in Microbiology.

**Rationale :** Soil microbe's plays important role in the biochemical cycling of elements in the biosphere where the essential elements undergo chemical transformation. Through the process of mineralization organic carbon, nitrogen, irons, Sulphur. Most important aspects of water microbiology are that we acquire numerous diseases from microorganisms found in water. Some of these diseases represent intoxications. One category of intoxication comes from drinking water which contains toxins produced by microorganisms.

**Course Objectives:** To Study Physicochemical properties of soil, soil microflora, Biochemical transformation in soil, Bacteriological examination of drinking water, Types of waste water, Microbial interaction.

.

**Course Outcomes:** At the end of the course, students shall be able to

(i) Students will study about role of microorganisms in soil, role of microorganisms in sulphar cycle, iron cycle, phosphorus cycle, and nitrogen cycle.

(ii) Students will also learn about Quantitative & Qualitative analysis of drinking water, filtration, and sedimentation, Primary and secondary waste water treatment procedure.

(iii)Students will familiarize with the standard methods and procedures for measuring BOD, COD, and TOC and they will explore real-world applications of BOD, COD, and TOC measurements in various industries, such as wastewater treatment, environmental monitoring, and industrial effluent management.

(iv) Students will be able to explain the ecological roles and types of microorganisms found in soil and able to prepare soil samples for different methods of studying soil micro flora and identify microorganisms based on morphology.

| Unit | Topic | Content | Hrs. | Weightage |
|---|---|---|---|---|
| 1 | | **MICROBIOLOGY OF SOIL** | 15 | 33.3% |
| | **1.1** | Physicochemical properties of soil, soil as a culture Medium. | | |
| | **1.2** | Microbial flora of Soil, Role of microorganisms in soil: Mineralization and humus formation. | | |
| | **1.3** | Methods of studying soil micro flora: Direct microscopic method, agar plate technique, enrichment Culture technique, and buried slide method, Molecular methods for study of Soil microorganism. | | |
| | **1.4** | Microbial interactions and associations in soil:(i) Neutral, Positive (Symbiosis, Mutualism, Syntrophism, Commensalism, Synergism) and Negative(Antagonism, Competition, Parasitism, Predation) associations, Interaction between plant roots and microorganisms:Rhizosphere and its significance, Mycorrhiza. | | |
| 2 | | **MICROORGANISM AS BIOGEOCHEMICAL AGENT** | 15 | 33.3% |
| | **2.1** | Introduction to biogeochemical transformations in soil: Mineralization and immobilization of elements. | | |
| | **2.2** | Rotation of elements in nature, Nitrogen cycle: Proteolysis, ammonification, nitrification, denitrification and nitrogen fixation.<br>Sulfur cycle: Sulfur oxidation and reduction, Carbon cycle, Degradation of complex organic compounds, carbon dioxide fixation. | | |
| | **2.3** | Iron cycle: Iron oxidation and reduction.<br>Phosphorus cycle: Mineralization, immobilization and solubilization of phosphorus | | |
| | **2.4** | Soil fertility: Role of microorganisms in soil fertility, biofertilizers. | | |
| 3 | | **MICROBIOLOGY OF DRINKING WATER AND WASTEWATER** | | |
| | **3.1** | Natural waters: Sources of contamination, Microbial indicators of faecal pollution: Coliforms | | |

| | | | | |
|---|---|---|---|---|
| | | as indicator. Microbial indicators other than Coliforms.<br>Nuisance organisms in water: Slime forming bacteria, iron and sulfur bacteria and algae. | **15** | **33.3%** |
| | **3.2** | Bacteriological examination of drinking water: Sampling, Quantitative analysis: Standard Plate Count. Qualitative analysis: Multiple tube fermentation<br>Purification of drinking water: Sedimentation, filtration and disinfection, softening of hard water, use of Reverse Osmosis process. | | |
| | **3.3** | Types of wastewater, chemical and microbiological BOD, COD and TOC as indicators of strength of wastewater.<br>Methods of wastewater treatment: Primary treatment and secondary treatment. Principles and role of microorganisms trickling filters, activated sludge process, oxidation ponds. | | |
| | **3.4** | Efficiency of wastewater treatment procedures. | | |

**Reference Books**

1 Microbiology by Pelczar, Jr., Michael
2 Modi H A., (2013), Soil Microbiology, Aavishkar Publishers, Jaipur.
3 Atlas R M., (1997), Principles of Microbiology. 2nded. Wm. C. Brown Pub., Iowa, USA
4 Alexander M, (1977), Soil Microbiology, 2nded Krieger Publ. Co., Melbourne, FL.

## LIST OF EXPERIMENTS

1) **Microbiological analysis of soil** -Enumeration of organisms from soil (Standard plate count-Soil).
2) Isolation of symbiotic & non-symbiotic nitrogen fixing bacteria from soil.
3) Cultivation and isolation of Actinomycetes from Soil sample.

**4)** Cultivation and isolation of Yeast.

**5)** **Microbiological analysis of drinking water.**
- Standard plate count of drinking water.

**6)** **Microbiological analysis of drinking water.**
- Determination of MPN of coliforms in water
- Detection of fecal pollution of water by performing presumptive test, confirmed testand completed test.

**7)** Determination of DO from the water sample.

**8)** Study of ingredient used in culture media: Agar, peptones, amino acids, antibiotics, beef extract, bile salt, blood, casein hydrolysate, water, dyes ,gelatin, inorganic salts, meat extract, yeast extract.

**9)** Study **of effect of antibiotics on bacteria :**
- Study of sensitivity spectrum of antibiotics against the test organism by use of paperdisc method and Agar ditch method.

**CO-PO & CO-PSO Mapping**

| **Course Outcomes** | **Program Outcomes 1: Less relevant, 2: Mild relevant, 3: Highly relevant** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | - | 1 | 1 | 2 | - | - | 2 | - | 2 | - |
| CO2 | 3 | 3 | 1 | 2 | 2 | - | - | 3 | 1 | 2 | 2 |
| CO3 | 3 | 3 | 1 | 1 | 2 | 1 | - | 3 | 1 | 3 | 2 |
| CO4 | 2 | 2 | 1 | 1 | 2 | - | - | 2 | - | 2 | 2 |

<table>
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<tr><td colspan="2">Course Code:</td><td colspan="2">DPMIC401DSC</td><td colspan="2">Semester:</td><td colspan="2">IV</td></tr>
<tr><td colspan="8">MICROBIAL BIODIVERSITY</td></tr>
<tr><td colspan="2" rowspan="2">Course type:</td><td colspan="2" rowspan="2">Discipline Specific Course</td><td colspan="2" rowspan="2">Total Credit:</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
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<tr><td>25</td><td>25</td><td>50</td><td>75</td><td>25</td><td>100</td></tr>
</table>

**Pre-requisite:** Having Passed 3rd semester of B.Sc. in Microbiology.

**Rationale :** The diversity of microorganisms is critical to the functioning of the ecosystem, because there is the need to maintain ecological processes such as decomposition of organic matter, nutrient cycling, soil aggregation and controlling pathogens within the ecosystem.

**Course Objectives:** To complement the students with the knowledge about Biodiversity of Microorganisms, Methods for Biodiversity assessment.

**Course Outcomes:** At the end of the course, students shall be able to

(i) Students will gain knowledge about origin of biodiversity, species concept, Levels and Value of biodiversity
(ii) Students will Study about Microscopic methods, Cultural methods, Molecular and genomic methods, Importance of DNA and r-RNA sequence comparison, determination of GC content.
(iii) Students will Learn about the role of biodiversity in ecosystem functioning and stability and Understand the economic benefits of biodiversity (medicinal resources, agricultural diversity, ecotourism).

(iv) Evaluate the impact of biodiversity on livelihoods and global economies; Recognize the cultural, spiritual, and recreational importance of biodiversity to human societies and Identify human-induced threats to biodiversity (habitat destruction, pollution, overexploitation).

(v) Students will Study about Physiological, metabolic, Morphological, Cellular and ecological diversity of Fungi, Algae, Protozoa, Viriods, Prions, Lichens etc.

| Unit | Topic | Content | Hrs | Weightage |
|---|---|---|---|---|
| 1 | | **INTRODUCTION TO BIODIVERSITY & METHODS OF ASSESSING BIODIVERSITY** | 15 | 33.3% |
| | **1.1** | What is biodiversity?<br>Origin of life, evolution and origin of biodiversity, species concept. | | |
| | **1.2** | Evolutionary tree of microorganisms.<br>Value of biodiversity, microbial biodiversity asindex of environmental change. | | |
| | **1.3** | Microscopic methods: Basic microscopy and microscopic analysis in microbial diversity assessment. Cultural methods: Biochemical /Metabolite | | |
| | **1.4** | Molecular and genomic methods: Molecular context of microbial diversity.<br>Importance of DNA and r-RNA sequence comparison, determination of GC content | | |
| 2 | | **BIODIVERSITY AMONG BACTERIA** | 15 | 33.3% |
| | **2.1** | Morphological and cellular diversity: Diversity in major cell shape and grouping. Diversity in ultra- structure of cell with reference to cell envelope, Cell membrane, cell wall, surface appendages, other cell organelles and spore. | | |
| | **2.2** | Physiological and metabolic diversity. Diversity in photosynthetic, heterotrophic and autotrophic metabolism. | | |
| | **2.3** | Ecological diversity: Diversity in major ecosystems. | | |
| | **2.4** | Diversity in aquatic, marine and extreme environment. | | |
| | | **BIODIVERSITY AMONG EUKARYOTIC AND ACELLULAR MICROORGANISMS** | | |
| | **3.1** | Eucarya: Morphological, cellular, physiological, metabolic and ecological characteristics of Protozoans and Slime molds. | | |

| | | | | |
|---|---|---|---|---|
| 3 | **3.2** | Morphological, cellular, physiological, metabolic and ecological characteristics of Fungi and Algae. | **15** | **33.3%** |
| | **3.3** | Lichens as consortium of algae and fungi. | | |
| | **3.4** | Acellular organisms: Viroids and prions. | | |

**Reference Books**

1. Modi H.A., (2014), Introductory Microbial world, Shanti Prakashan, Ahmedabad.
2. Atlas R M, Bartha R, (1998), Microbial Ecology: Fundamentals & Applications. 4th edn. Pearson Education.
3. Ogunseitan O., (2005) Microbial Diversity: Form and Function in Prokaryotes, Blackwell Publishing, Malden, MA, Oxford, Victoria.
4. Cambell R., (1983), Microbial Ecology, 2nd edn. Blackwell Scientific Publication.

## LIST OF EXPERIMENTS

**1)** Study of ecological diversity amongst bacteria: Cultivation of Acidophilic and Alkaliphilic bacteria.

**2)** Study of ecological diversity amongst bacteria: Cultivation of Halophilic and Non-halophilic bacteria.

**3)** Study of ecological diversity amongst bacteria: Cultivation of Thermophilic and Mesophilic bacteria

**4)** Study of morphological and cultural diversity of Escherichia coli, Enterobacter aerogenes, Staphylococcus aureus, Bacillus subtilis, Bacillus megaterium and Bacillus cereus, S. marcescens.

- Study of morphological diversity by performing Gram's staining, capsule staining and spore staining.

**5)** Study of cultural / growth diversity using nutrient broth and nutrient agar media.

**6)** Study of metabolic diversity amongst bacteria: Escherichia coli, Enterobacter aerogenes, Proteus vulgaris, Staphylococcus aureus, and Bacillus subtilis by performing various biochemical tests:

**(A)** Based on carbon metabolism

i. Methyl Red Test
ii. Voges-Proskauer (V-P) test,
iii. Fermentation of sugars and sugar alcohol: glucose, xylose, mannitol, lactose, maltose and sucrose,
iv. Citrate utilization test,
v. Starch utilization test,
vi. Lipid utilization test.

**(B)** Based nitrogen metabolism.

i. Indole production test
ii. H2S production test
iii. Urea utilization test,
iv. Casein hydrolysis test
v. Gelatin hydrolysis test.

**(C)** Presence of respiratory enzymes.

i. Catalase test,

i. Dehydrogenase test,
ii. Oxidase test.

**CO-PO & CO-PSO Mapping**

| **Course Outcomes** | **Program Outcomes 1: Less relevant, 2: Mild relevant, 3: Highly relevant** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | - | 1 | 1 | 2 | - | 2 | 2 | 2 | 2 | - |
| CO2 | 2 | 2 | 1 | 1 | 2 | - | - | 3 | - | 2 | 2 |
| CO3 | 3 | - | 1 | 1 | 2 | - | 2 | 2 | 2 | 2 | - |
| CO4 | 2 | - | 2 | 1 | 2 | - | 2 | 3 | 2 | 2 | - |
| CO5 | 3 | - | 1 | 1 | 1 | - | - | 2 | - | 2 | - |

<table>
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<tr><td colspan="2">Course Code:</td><td colspan="2">DPMIC402DSC</td><td>Semester:</td><td colspan="3">IV</td></tr>
<tr><td colspan="8">FOOD AND DAIRY MICROBIOLOGY</td></tr>
<tr><td colspan="2" rowspan="2">Course type:</td><td colspan="2" rowspan="2">Discipline Specific Course</td><td rowspan="2">Total Credit:</td><td>Theory</td><td>Practical</td><td>Total</td></tr>
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<tr><td>25</td><td>25</td><td>50</td><td>75</td><td>25</td><td>100</td></tr>
</table>

**Pre-requisite:** Having Passed 3rd semester of B.Sc. in Microbiology.

**Rationale :** Microbiology is important to food safety, production, processing, preservation and storage. Microbes such as bacteria, molds, yeast are employed for the foods production and food ingredients such as production of wine, beer, bakery, and dairy products.

**Course Objectives:** To complement the students with the knowledge about Food born infection, food born poisoning, food spoilage by microbes and their preservations.

**Course Outcomes:** At the end of the course, students shall be able to

(i) Students will learn about microbial flora of food, Major food born diseases, Factors affecting kinds and numbers of microorganisms, Microbial Spoilage of food

(ii) Students will study about Preservation methods such as Pasteurization, sterilization, canning, Refrigeration, Freezing etc.

(iii) Students will study about Biological methods: Generalized scheme for microbiological examination. Direct microscopic examination, CFU, MPN and Bacteriological analysis of milk.

(iv) Students will gain knowledge about Staphylococcus aureus food poisoning, Botulism, Biochemical changes in food by microbes, Role of microbes in kefir , kumiss, pickles, importance of probiotics,

| Unit | Topic | Content | Hrs. | Weightage |
|---|---|---|---|---|
| 1 | | **MICROBES IN FOOD BORNE INFECTION AND POISONING** | 15 | 33.3% |
| | **1.1** | Food as a substrate for microorganisms Microbial flora of foods: Milk, fruits, vegetables meat, eggs | | |
| | **1.2** | Factors affecting kinds and numbers of microorganisms: intrinsic and extrinsic | | |
| | **1.3** | Food and milk borne infections Sources of contamination and Major food and milk borne diseases. | | |
| | **1.4** | Food poisoning:<br>A. Microorganisms involved, sources of contamination.<br>B. Role of Staphylococcus aureus, Clostridium botulinum and Salmonella spp.<br>C. Molds as poisoning agents | | |
| 2 | | **MICROBIAL FOOD SPOILAGE AND PRESERVATION** | 15 | 33.3% |
| | **2.1** | Microbial Spoilage of food: Causes of spoilage Biochemical changes due to microbes. | | |
| | **2.2** | Spoilage of milk and milk products, fruits, vegetables, eggs, meat Spoilage of canned foods. | | |
| | **2.3** | Preservation of food and Milk: General principles | | |
| | **2.4** | Methods of preservation:<br>i. Use of aseptic handling.<br>ii. High temperature: Pasteurization (with Phosphatase), sterilization, canning.<br>iii. Low temperature: Refrigeration and freezing. | | |
| | | **MICROBES AS FOOD AND FOOD PRODUCTS WITH THEIR METHODS** | | |
| | **3.1** | Fermented dairy products<br>Starter culture, Cheese: Types, curdling, processing, ripening. Other fermented dairy productsYogurt, cultured buttermilk, Kefir and cultured sour milk. | | |

| | | | | |
|---|---|---|---|---|
| | | Introduction to probiotics, prebiotics and synbiotics, functional foods. | **15** | **33.3%** |
| | **3.2** | Indian fermented food products: Pickles, idli, Khaman and bread. Microbes as food: Mushrooms, spirulina and yeasts. | | |
| | **3.3** | Biological methods: Generalized scheme for microbiological examination. Direct microscopic examination, colony forming units (CFU), Most probable number (MPN), | | |
| | **3.4** | Bacteriological analysis of milk: Grading of milk - Resazurin test.<br>Determination of efficiency of pasteurization: Phosphatasetest. | | |

**Reference Books**

1. Frazier W C and Westhoff D C (1988). Food Microbiology, 4th ed. McGraw-Hill, NY
2. Modi H.A., (2009). Dairy Microbiology, Aavishkar Publishers, Jaipur
3. Prescott L, Harley J P, and Klein D A, (2008). Microbiology, 7th ed. Wm C. Brown McGraw Hill, Dubuque IA
4. Pelczar Jr, M J, Chan E C S, Krieg N R, (1986). Microbiology: An Application Based Approach, 5th edn. McGraw-Hill Book Company, NY.

## LIST OF EXPERIMENTS

1) **Microbiological analysis of Milk-** Standard plate count (SPC) of Milk sample.
2) Determination of microbial load of milk by use of MBRT of raw milk, boiled milk and pasteurized milk.
3) Detection of acid-fast organisms in milk sample.
4) **Microbiological analysis of Food-** Standard plate count (SPC) of food sample.
5) Determination of MPN of coliform.
6) Determination of MIC (Minimum Inhibitory Concentration)
7) Preservation of food and Milk: General Principles & Procedure.

**8)** Bacteriological analysis of milk: Grading of milk - Resazurin test.

**9)** Bacteriological analysis of milk: Methylene blue red test (MBRT).

**CO-PO & CO-PSO Mapping**

| **Course Outcomes** | **Program Outcomes 1: Less relevant, 2: Mild relevant, 3: Highly relevant** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PSO1 | PSO2 |
| CO1 | 3 | - | 1 | 1 | 2 | - | 1 | 2 | 1 | 2 | - |
| CO2 | 2 | 3 | 1 | 1 | 2 | - | - | 2 | - | 2 | 2 |
| CO3 | 3 | 2 | 1 | - | 2 | - | - | 3 | - | 2 | 2 |
| CO4 | 2 | - | 1 | - | 2 | - | - | 2 | - | 2 | - |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| **Year :** | 2023/24 | **Semester :** | I |
| **Course title :** | Fundamentals of Programming Language 'C' | **Course code :** | CPMJDSCAFC101 |
| **Course type :** | Theory | **Course credit :** | 04 |
| **Pre-requisite :** | Basic Knowledge of Computer | | |
| **Rationale :** | To introduce students the essentials of computer Programming and programming methodology using C language | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 0 | 0 | 4 | 30 | 20 | 50 | 100 |

**Course Objective:**

1. Students will understand to formulate a computing problem to executable computer program using C language.
2. Students will understand about compiler based programming languages
3. Students will learn concepts of variables, literals, data types, conversions of data types, input and output data and processing of data, inbuilt functions, arrays, header files, conditional and iterative statements.

**Course Outcome:**

1. Design and implement C programs to solve complex problems.
2. Describe the purpose and usage of basic c concept,control flow statements, looping and branching statements, array.
3. Analyze and predict the output of more complex C programs and identify and correct logical errors in C code.
4. Recognize and recall C language syntax and keywords,data types and their characteristics, variables, control flow statements, looping, array to create logical program structures and their usage.
5. Assess the quality of code in terms of readability, maintainability, and adherence to coding standards.

## Content

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | **Introduction to Programming**<br>Concepts of Algorithm and Flowcharts, problem solving examples using algorithm and flowchart, Types of Programming languages, Characteristics of higher level language, Compiler and Interpreter<br>**Overview of C Introduction**<br>Importance of C, Sample C programs, Basic structure of C programs, Programming style, executing of C program<br>**Constants, Variables and data Types**<br>Introduction, Character Set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of Variables, Defining symbolic constants | 1 | 25 % |
| II | **Operators and Expression** Introduction, Arithmetic of Operators, Relational Operators, Logical Operators, Assignment Operators, Increment and Decrement Operators, Conditional Operators, Bit-wise Operators, Special Operators, Arithmetic Expressions, Evaluation of expressions, Precedence of arithmetic operators, Type conversions in expressions, Operator precedence and associativity, Mathematical functions.<br>**Input & Output Operators**<br>Introduction, reading a character, writing a character, formatted input, formatted output. | 1 | 25 % |
| III | **Branching and Looping**<br>Introduction Decision making with Simple IF statement, IF ELSE statement, Nesting of IF ELSE statements, The ELSE IF ladder, The switch statement, the turnery (? :) Operator, the GOTO statement. **Iterative Statement**<br>Introduction WHILE statement, the DO statement, The FOR statement, Jumps in loops Break and continue | 1 | 25 % |
| IV | **Array & String**<br>Introduction, One-dimensional, arrays, Two-dimensional arrays, Initialization of two- dimensional arrays, Concept of Multidimensional arrays<br>**Handling of Character strings**<br>Introduction, Declaring and initializing string variables, Reading strings from terminal, Writing strings to screen, Arithmetic | 1 | 25 % |

| | | | |
|---|---|---|---|
| | operations on characters, Putting string together, String Operations: String Copy, String Compare, String Concatenation And String Length, String Handling functions, Table of strings | | |

**Reference Books:**

1. Programming in C, Balaguruswami – TMH
2. C: How to Program, Deitel & Deitel - PHI
3. C Programming Language, Kernigham & Ritchie - TMH

**Suggested Readings:**

1. Mastering Turbo C, Kelly & Bootle - BPB
2. C Language Programming – Byron Gottfried - TMH
3. Let us C, Yashwant Kanetkar - BPB Publication

**Online Resources:**

1. https://www.w3schools.com/
2. https://www.tutorialspoint.com/
3. https://www.programiz.com/
4. https://www.cprogramming.com/

| **Course Outcome** Fundamentals of Programming Language 'C', CPMJDSCAPC101 | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO -1** | **PO -2** | **PO -3** | **PO -4** | **PO -5** | **PO -6** | **PO -7** | **PO -8** | **PO -9** | **PO -10** | **PO -11** | **PO -12** | **PSO -1** | **PSO -2** |
| **CO-1** | 2 | 1 | | | | 3 | 3 | | | | | | | 2 |
| **CO-2** | 3 | | | | | 3 | 3 | | | | | | | |
| **CO-3** | | 3 | 3 | | | 2 | 3 | | | | | | | |
| **CO-4** | 2 | | | | | 3 | 3 | | | | | | 3 | |
| **CO-5** | 1 | | | | | | | | | | | | 3 | |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| Year : | 2023/24 | **Semester :** | I |
| **Course title :** | Database Management System | **Course code :** | CPMJDSCADB101A |
| **Course type :** | Theory | **Course credit :** | 04 |
| **Pre-requisite :** | Knowledge about Database Management System | | |
| **Rationale :** | DBMS helps to share the data Quickly, effectively and securely and also access the data vary fast with the accurate result.<br>It gives to knowledge to the student how the data can be stored and accessed. | | |

**Teaching Examination Scheme:**

| Teaching (Hours/week) | | | Examination Scheme | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 4 | 0 | 0 | 30 | 20 | 50 | 100 |

**Course Objective :**

1. Make access to the data easy for the user.
2. Protect Data From Physical harm and unauthorized systems.
3. Allow for growth in the data base system.

**Course Outcome:**

1. Evaluate the security and integrity of a database system
2. Analyze different types of database models (relational, hierarchical, network)
3. Apply normalization techniques to design and optimize database schemas
4. Explain the principles of database management systems in organizing and retrieving information.
5. Recognize fundamental concepts of databases, such as tables, records, fields, and keys and Memorize and list common terms used in database management.

## Content

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | Database and DBMS, Comparison between traditional file V/s DBMS, Characteristics of data in database, Components of database system environment, Functions of DBMS, Advantages and disadvantages of the DBMS, DBMS users, Database administrator, Role of DBA | 1 | 25 % |
| II | Essentials of Database Design, Three level Architecture of Database- external, conceptual and internal, Data Models concepts: Hierarchical, Network and Relational, Operators, relations, domains and attributes, keys, traditional set operations, special relational operations. | 1 | 25 % |
| III | **The E/R model :** Entity, E-R Diagram, Attributes, Relationship & Types, Development stages of E-R diagram & Examples<br><br>**Normalization:** Normalization Process, 1 st NF , 2 nd NF, 3 rd NF, demoralization. | 1 | 25 % |
| IV | Introduction of Database<br>Data type - Text, Number, Auto number, Currency, Boolean, Date/Time, Memo Object – Table, Query, Forms, Reports<br>Controls use in form and report | 1 | 25 % |

**Reference Books:**

1. Database System Concepts: – Henry F. Korth&AbrahimSilberschatz –McGraw Hill Education
2. Introduction to database Management – Navin Prakash -TMH
3. Introduction to Database System C. J. Date (7 Edition) Low Price Edition
4. MS Office Fundamental & Internet

**Suggested Readings:**

1. Introduction to database Management – Navin Prakash -TMH

**Online Resources:**

1. https://www.geeksforgeeks.org/dbms
2. https://www.javatpoint.com/dbms-tutorial
3. https://www.tutorialspoint.com/dbms/index.htm

| **Course Outcome** | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Database Management System, CPMJDSCADB101A | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **PSO-1** | **PSO-2** |
| **CO-1** | 1 | | | | | 3 | 3 | | | | | | | |
| **CO-2** | | 3 | 2 | | 2 | | | 2 | | | | | | |
| **CO-3** | | | | | | | | 3 | | | | 1 | | |
| **CO-4** | 3 | | 2 | | | 1 | 3 | | | | | | 2 | |
| **CO-5** | | | | | | 2 | 3 | | | | | | 3 | |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| **Year :** | **2023/24** | **Semester :** | I |
| **Course title :** | Fundamentals of Computer | **Course code :** | CPMNDSCAFC102 |
| **Course type :** | Theory | **Course credit :** | 04 |
| **Pre-requisite :** | Knowledge about Fundamental of computer and Office Automation Tools | | |
| **Rationale :** | Student can understand how to reduce manual efforts and store large amount of data in a little space which is very important in day to day task for the speed up information retrieve. | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 4 | 0 | 0 | 30 | 20 | 50 | 100 |

**Course Objective:**

1. To give basic information about the computer system.
2. To give knowledge about computer hardware and computer software.
3. To familiarize students with the use of MS Windows, Internet and E-mail
4. To familiarize students with the use of MS Office-MS Word, MS Excel & MS PowerPoint.

**Course Outcome:**

1. Identify the basic components of a computer system.
2. Explain the purpose of ribbons, menus, and toolbars in these applications.
3. Describe the process of creating, editing, and formatting text documents.
4. Apply advanced formatting and design techniques.
5. Identify common problems and errors in documents, spreadsheets, or presentations.

## Content

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | **Introduction to Computer Fundamentals**, Windows OS, Internet and Email Computer, Classification of computers, Parts of a computer, Operating System, Internet, Modem, Web browsers, E-mail, Establishing your email account | 1 | 25 % |
| II | **Introduction to Microsoft Word Basic components** of a Word window, Preparing a word document, Editing a prepared document, Adjusting the margin settings, Additional formatting options, Header and Footer options, Border and Shading of page, Drawing options, Inserting images, Mail merge options, Saving a document, Creating a new document, Inserting audio and video files | 1 | 25 % |
| III | **Introduction to Microsoft Excel** Enter data in excel workbook, Formatting toolbar, Shortcut to fill a series, Mathematical functions, Editing a data sheet, Format cell, Rename a sheet, Save, Open a workbook, Arrange data in ascending or descending order, Insert new cell column or row, Insert picture or clipart in excel sheet | 1 | 25 % |
| IV | **Introduction to Microsoft PowerPoint** How to create a new slide, How to apply animation to slides, Fill background with effects, How to apply sound to slides, How to save a presentation, Opening an existing presentation, Insert new slides with different layout, Editing a slide, Inserting picture to a slide, Inserting media files to PowerPoint slides | 1 | 25 % |

**Reference Books:**

1. MS-Office 2010 Training Guide by Prof. Satish Jain, M. Geetha: Complete guide for Step-byStep Learning Quick and Easy Reference for learning MS Office 2010

**Suggested Readings:**

1.MS-Office 2010 Training Guide by Prof. Satish Jain, M. Geetha: Complete guide for Step-byStep Learning Quick and Easy Reference for learning MS Office 2010

**Online Resources:**

1. https://www.w3schools.com
2. https://www.geeksforgeeks.org
3. https://support.office.com/

| **Course Outcome** Fundamentals of Computer CPMNDSCAFC102 | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **PSO-1** | **PSO-2** |
| **CO-1** | 3 | 1 | | 1 | 2 | 1 | 1 | | 2 | | 2 | | 3 | |
| **CO-2** | 3 | | 2 | | 3 | | | | | | | | | 2 |
| **CO-3** | 3 | | | | | | | | | | | | | 2 |
| **CO-4** | 3 | | | | | 2 | | | | | | | | 1 |
| **CO-5** | | | | 2 | | 2 | | 3 | 2 | 2 | | 1 | | 1 |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| **Year :** | **2023/24** | **Semester :** | I |
| **Course title :** | Digital Computer System Architecture | **Course code :** | CPMDCADC103 |
| **Course type :** | Theory | **Course credit :** | 04 |
| **Pre-requisite :** | The students should have a basic Understanding of Digital computer Organization and Architecture or Micro Processors | | |
| **Rationale :** | It gives information to students which gives the means of interconnectivity for a computer's hardware components as well as the mode of data transfer and processing exhibited. | | |

**Teaching Examination Scheme:**

| Teaching (Hours/week) | | | Examination Scheme | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 4 | 0 | 0 | 30 | 20 | 50 | 100 |

**Course Objective :**

1. To understand the structure, function and characteristics of computer system.
2. To identify and compare different method for computer I/O.
3. Identify and understand the Number system.

**Course Outcome:**

1. Recall fundamental concepts and terminology related to computer system architecture.
2. Interpret the purpose and functionality of different components in a computer system.
3. Apply knowledge of computer system architecture to solve problems or design simple systems.
4. Combine knowledge of computer system architecture to design innovative solutions.

## Content

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | Digital & Analog systems, Logic levels and pulse wave forms, digital computer, Major parts of computer, Hardware, Software - Application and System Software Computer generations<br>First generation, Second generation, Third generation, Forth generation, Fifth generation<br><br>Super Computers, Mainframes, Mini Computers, Palmtop PC, Laptop PC, Personal Computer, Workstations, Mainframe, Supercomputer.<br><br>Dos, Windows, Linux | 1 | 25 % |
| II | Communication devices -Modem, NIC, Switch, Hub<br>Keyboard, Mouse, Light pen, Joystick, Scanner, Voice input system, Touch<br>Monitor - CRT terminals (Monitor / VDU)<br>Non – CRT terminals, LCD, Plasma display, LED<br>Printer - Dot matrix printer, Ink jet printer, Laser printer, Line printer, Plotter<br>Magnetic memory - Magnetic disk, Hard disk, Floppy disk,<br>Semiconductor memory - RAM, ROM, Flash memory<br>Optical memory - CD, CD-ROM, CD-RAM, DVD, DVD-ROM, DVD-RAM<br>Cache memory, Physical & Virtual memory | 1 | 25 % |
| III | Number system - Binary, decimal, octal, hexadecimal<br>Conversion - Binary to decimal, decimal to binary, octal to decimal , decimal to octal, octal to binary, binary to octal, hexadecimal to binary, binary to hexadecimal, hexadecimal to Decimal, decimal to hexadecimal, hexadecimal to octal, octal to hexadecimal<br>Binary arithmetic – Addition, subtraction (simple method) | 1 | 25 % |
| IV | Logic gates - AND, OR, NOT, NAND, NOR, Exclusive-OR, Exclusive-NOR<br>Data Processing circuit - Decoder, Encoder | 1 | 25 % |

**Reference Books:**

1. Fundamentals of computers – By. V. Rajaraman PHI Publication
2. How computer work: Ron White – Tech media
3. O-Level (Information Technology) - By V.K.Jain (Module- M1.1)
4. Computer Fundamentals: Pradeep K. Sinha &Priti Sinha (BPB)
5. Fundamentals of computers – By. Anand Kumar PHI Publication

**Suggested Books:**

1. Fundamentals of computers – By. Anand Kumar PHI Publication

**Online Resources:**

1. https://edu.gcfglobal.org/en/computerbasics/what-is-a-computer/1/
2. https://www.tutorialspoint.com/digital_circuits/digital_circuits_logic_gates.htm
3. https://www.tutorialspoint.com/computer_fundamentals/computer_number_system.htm

| **Course Outcomes** Digital Computer System Architecture, CPMDCADC103 | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO -1** | **PO -2** | **PO -3** | **PO -4** | **PO -5** | **PO -6** | **PO -7** | **PO -8** | **PO -9** | **PO -10** | **PO -11** | **PO -12** | **PSO -1** | **PSO -2** |
| **CO-1** | 3 | | | | 3 | 1 | 3 | | | | | | 3 | |
| **CO-2** | 3 | | | | 1 | 3 | | | | 2 | | | | |
| **CO-3** | 2 | | 1 | 1 | | | | | | | | | 3 | |
| **CO-4** | 2 | | 2 | | | | | | | | | | | |

| | | | |
|---|---|---|---|
| **Program:** | BCA | **Subject / Branch:** | NA |
| **Year:** | **2023/24** | **Semester:** | I |
| **Course title:** | Mathematics | **Course code:** | CPSECAMA106 |
| **Course type:** | Theory | **Course credit:** | 02 |
| **Pre-requisite :** | Have basic knowledge of mathematics | | |
| **Rationale :** | Math allows students to very quickly explore non-trivial ”real world” problems that are challenging and interesting. | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 2 | 0 | 0 | 15 | 10 | 25 | 50 |

**Course Objective:**

Introduce concept of mathematical logic for analyzing proposition and proving theorem. Use sets for solving applied problems, and use the properties of set operations algebraically.

**Course Outcome:**

1. Determine whether or not a given matrix is invertible and if is, find its inverse.
2. Perform the matrix operations of addition, multiplication and express a system of simultaneous linear equation in matrix form.
3. Determine if an infinite sequence is bounded, monotonic or oscillating
4. Recall basic set theory, Function, Matrices and Determinants, Sequence and Series

## Content

| Unit | Set Theory | Credit | Weightage |
|---|---|---|---|
| I | Definition and notation of Set, Methods of representation of set (Property and List Method), set of numbers (Natural, Integers, Rational, Irrational, Real),<br><br>Definition: Finite set, Infinite set, Empty set, Singleton set, Subset, Proper subset of a set, Power set, Universal set, Complement of a set, Cardinality of set, Venn Diagrams,<br><br>Set Operations: Union of two sets, Intersection of two sets, Disjoint sets, Equality of sets, Equivalent sets, Difference set, Symmetric Difference set, Cartesian product of sets,<br><br>Properties of set operations (Commutative, Associative, Distributive, De Morgan's laws) | 1 | 25 % |
| II | **Function** | | |
| | Introduction of Function, Definition of function, Domain, Co-domain, Image and Range of function, Types of function(with example): Linear, Quadratic, Polynomials, Rational, Irrational, Single value and Many value, Even and Odd, Explicit and Implicit<br><br>The Classification of functions: one-one, many-one, onto, into function, Evaluation of function, Composition of functions,<br><br>Mathematical functions (Definition with example): Floor and Ceiling function, Integer and Absolute value function, Remainder function, Exponential function,<br>logarithm function and its properties, Recursive function. | 1 | 25 % |

**Reference Books:**

1. Discrete Mathematics -Revised 3rd Edition Authors: **Seymour Lipschutz** and **Marc Lars Lipson,** Publication: McGraw-Hill Education (India) Pvt Limited
2. Elements of Discrete Mathematics -3rd Edition Authors: Chung Laung Liu and Durga Prasad Mohapatra Publication: McGraw-Hill Education (India) Pvt Limited
3. Discrete Mathematics -3rd Edition Author: J. K. Sharma

**Suggested Books:**

1. Elements of Discrete Mathematics -3rd Edition Authors: Chung Laung Liu and Durga Prasad Mohapatra Publication: McGraw-Hill Education (India) Pvt Limited

**Online Resources:**

1. https://www.weareteachers.com/best-math-websites/

| Course Outcomes<br><br>Mathematics, CPSECAMA106 | Expected Mapping with Programme Outcomes<br>(1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation) | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO -1** | **PO -2** | **PO -3** | **PO -4** | **PO -5** | **PO -6** | **PO -7** | **PO -8** | **PO -9** | **PO -10** | **PO -11** | **PO -12** | **PSO -1** | **PSO -2** |
| **CO-1** | 3 | 2 | | | | | | | | | | | | |
| **CO-2** | | | | | | 3 | 2 | | | | | | | |
| **CO-3** | 2 | 1 | | | | | | | | | | | | |
| **CO-4** | | 2 | | | | 3 | 3 | | | 1 | | | 2 | |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| **Year :** | **2023/24** | **Semester :** | I |
| **Course title :** | Communication Skills - 1 | **Course code :** | CPAECACS104 |
| **Course type :** | Theory | **Course credit :** | 02 |
| **Pre-requisite :** | Basic Knowledge of English Language | | |
| **Rationale :** | To make the students confident and make them aware about their personality development. | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 2 | 0 | 0 | 15 | 10 | 25 | 50 |

**Course Objective :**

1. Students will develop their confidence.
2. Students will understand the importance of personality development and self awareness.
3. Students understand the importance of language and learn different techniques of interview, presentation etc.

**Course Outcome:**

1. Demonstrate the ability to articulate ideas clearly and confidently in spoken form.
2. Develop active listening skills, enabling them to comprehend and respond appropriately to various communication cues.
3. Enhance their written communication skills, producing clear, concise, and organized written documents.
4. Evaluate the effectiveness of different communication methods.
5. Implement learned communication techniques in real-world scenarios
6. Apply effective communication strategies in digital environments, including email, video conferencing, and social media.

## Content

| Unit | Theory of Communication | Credit | Weightage |
|---|---|---|---|
| I | **Communication**<br>➔ Meaning and Objectives<br>➔ Process and Importance,<br>➔ Barriers<br><br>**Methods of Communication**<br>➔ Verbal and Non-Verbal<br>➔ Horizontal,<br>➔ Grapevine<br><br>**Steps of Effective Communication** | 1 | 25 % |
| II | **Grammar**<br>➔ Parts of Speech<br>➔ Subject Verb Agreement<br>➔ Indirect speech<br>➔ Auxiliaries and Modals<br>➔ Questions and Negatives | 1 | 25 % |

**Reference Books:**

1. Communication Skills – Vithal Patel
2. English Grammar Composition and Effective Business Communication- Pink and Thomas – S. Chand

**Suggested Readings:**

1. Story books to increase vocabulary.
2. Listen Motivational videos.
3. Read interested area in English News Papers.

**Online Resources:**

1. https://learnenglish.britishcouncil.org/grammar-reference
2. https;//en.m.wikipedia.org/communication

| **Course Outcomes** Communication Skills - 1 CPAECACS104 | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO -1** | **PO -2** | **PO -3** | **PO -4** | **PO -5** | **PO -6** | **PO -7** | **PO -8** | **PO -9** | **PO -10** | **PO -11** | **PO -12** | **PSO -1** | **PSO -2** |
| **CO-1** | | | | | | 2 | 3 | | 3 | | 3 | | | |
| **CO-2** | | | | | | | | | 3 | 1 | | | | |
| **CO-3** | | 2 | | | | | | | | | | 2 | | |
| **CO-4** | | | | | | | | | 3 | | | | | |
| **CO-5** | | | | | | | | | 3 | 2 | | | | |
| **CO-6** | 1 | | | | | 2 | 3 | | | | | | | |

| | | | |
|---|---|---|---|
| **Program:** | BCA | **Subject / Branch:** | NA |
| **Year:** | **2023/24** | **Semester:** | I |
| **Course title:** | Understanding India | **Course code:** | CPIKSAUI105 |
| **Course type:** | Theory | **Course credit:** | 02 |
| **Pre-requisite :** | knowledge of its diverse history, cultural richness, and socio-economic dynamics. | | |
| **Rationale :** | Acquiring knowledge about India is key for fostering cross-cultural understanding and participating in a globally interconnected world. | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 2 | 0 | 0 | 15 | 10 | 25 | 50 |

**Course Objective:**

1. The course aims at enabling the students to acquire and demonstrate the knowledge and understanding of contemporary India.
2. The course would also focus on developing an understanding among student-teachers of the Indian knowledge systems, the Indian education system, Indian tradition, art and culture and the roles

**Course Outcome:**

1. Demonstrate the ability to list key historical events, dates, and facts about India.
2. Identify and memorize important geographical features and landmarks of India.
3. Apply knowledge of India's political system to analyze current events.
4. Analyze the cultural influences on art, literature, and architecture in India.

## Content

| Unit | | Credit | Weightage |
|---|---|---|---|
| I | **Concept of Bharatvarsh:**<br>– Understanding Of Bharatvarsh.<br>– The Land of India: Landscape, Mountains and Rivers.<br>– The Glory of Indian Literature: Ved, Vedanga, Upanishads, Smriti, Puranas.<br>– Jain And Buddhist Literature.<br>– The Name of Our Country: Jambudvipa, Sindhu (Indus), Inde, Hind, Hindustan, Bharat India | 1 | 25 % |
| II | **Indian tradition, art and culture.**<br>– **Architecture and Sculpture**: Indus Valley town planning, rock cut architecture, major styles of temples, Mughal architecture, modern and contemporary architecture, stone and metal sculpture<br>– **Painting:** Ajanta murals, Mughal paintings, Madhubani paintings, paintings of Jharkhand (Kohbar, Sohrai, Jadopatia, etc.).<br>– **Music and Dance:** Overview of various forms of music and dances in India; Chau dance of Jharkhand and Odisha<br>– **Science, Technology and Medicine**: A general survey of the progress of science, technology and medicine in ancient India | 1 | 25 % |

**Reference Books:**

1. A.S. Altekar, Education in Ancient India, Nand Kishor's & Bros. Varasani, 1944.
2. Bhagvdatt: Brahad Bharat Ka Itihas, Pranav Prakashan, New Delhi
3. Narendra Mohan: Bharatiya Sanskruti, Prabhat Prakashan, Delhi 2005
4. Satish Chandra Mittal: Bharatiya Sanskruti ke char adhyay, akhil bharatiya itihas sankalan yojana, Delhi 2018
5. R.K. Shrivastava: Prachin Bharat ka Itihas tatha Sanskruti.

**Suggested Books:**

1. "India: A History" by John Keay
2. "The Argumentative Indian" by Amartya Sen

**Online Resources:**

1. www.indiatoday.in
2. www.understandingindia.in

| **Course Outcome** Understanding India CPIKSAUI105 | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **PSO-1** | **PSO-2** |
| **CO-1** | | | | 2 | | | | | | 1 | | | 1 | |
| **CO-2** | | 3 | 2 | | | | | | | 2 | | | | |
| **CO-3** | | | | | | | | | | 3 | | | | |
| **CO-4** | | 3 | | | | | | | | 3 | | 2 | | |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| **Year :** | 2023/24 | **Semester :** | I |
| **Course title :** | Practical - Fundamentals of Programming Language 'C' | **Course code :** | CPMNDSCAFC102 |
| **Course type :** | Practical | **Course credit :** | 02 |
| **Pre-requisite :** | Basic Knowledge of Computer | | |
| **Rationale :** | To introduce students the essentials of computer Programming and programming methodology using C language | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 4 | 0 | 0 | 15 | 10 | 25 | 50 |

**Course Objective:**

1. Students will understand to formulate a computing problem to executable computer program using C language.
2. Students will understand about compiler based programming languages
3. Students will learn concepts of variables, literals, data types, conversions of data types, input and output data and processing of data, inbuilt functions, arrays, header files, conditional and iterative statements.

**Course Outcome:**

1. Design and implement C programs to solve complex problems.
2. Describe the purpose and usage of basic c concept,control flow statements, looping and branching statements, array.
3. Analyze and predict the output of more complex C programs and identify and correct logical errors in C code.
4. Recognize and recall C language syntax and keywords,data types and their characteristics, variables, control flow statements, looping, array to create logical program structures and their usage.
5. Assess the quality of code in terms of readability, maintainability, and adherence to coding standards.

## Practical List

| **Practical:** |
| --- |
| 1. Write a C program to display "Gokul University" on the screen. |
| 2. Write a C program to find the area of circle using the formula Area=PI * r * r. |
| 3. Write a C program to find the area of rectangle, cube and triangle. (Formula are: Rectangle=l *b*h, triangle = (I * b) * 0.5, cube = L*L*L |
| 4. Write a C program to evaluate simple interest I = P*R*N / 100. |
| 5.Write a C program to enter a distance into K.M and convert it in to meter, feet, inches and Centimeter |
| 6. Write a C program to interchange two numbers. |
| 7. Write a C program to convert Fahrenheit into centigrade |
| 8. Write a C program for summation, subtraction, multiplication, division of two number using Arithmetic operator |
| 9. Write a C program to find out the largest value from given three numbers using conditional Operator |
| 10. Write a C program to find the maximum number from given three numbers. |
| 11.Write a C program to find that the enter number is Negative, or Positive or Zero. |
| 12.Write a C program to Checked whether entered char is capital, small, digit or any special Character |
| 13.Write a C program to find out the max. and min. number from given 10 numbers. |
| 14.Write a C program to find the sum of digit of accepted number. |
| 15.Write a C program to find the sum of first 100 odd numbers. And even numbers. |
| 16.Write a C program to display first 25 Fibonacci nos. |
| 17.Write a C program to check the accepted number is prime number or not. |

18. Write a C program to display first' 100 prime numbers.
19. Write a C program to find factorial of accepted numbers.
20. Write a C program to print accepted no and its reverse number.
21. Write a C program to convert decimal numbers into equivalent hexadecimal number.
22. Write a C program to display first 5 Armstrong number.
23. Write a C program to arrange the accepted numbers in ascending order and descending order.
24. Write a C program to find whether the accepted string is palindrome or not.
25. Write a C program to convert given line into upper case or lower case.
26. Write a C program to count no of word, character, line and space from given text.
27. Write a C program to display following output on the screen.

```
1
12
123
1234
```

28. Write a C program to display following output on the screen.

```
0
1 1
1 0 1
0 1 0 1
1 0 1 0 1
```

29. Write a C program to display following output on the screen.

```
1
22
3 3 3
4 4 4 4
```

30. Write a C program to find maximum & minimum value from the given array

**Reference Books:**

1. Programming in C, Balaguruswami – TMH
2. C: How to Program, Deitel & Deitel - PHI
3. C Programming Language, Kernigham & Ritchie - TMH

**Suggested Readings:**

1. Mastering Turbo C, Kelly & Bootle - BPB
2. C Language Programming – Byron Gottfried - TMH
3. Let us C, Yashwant Kanetkar - BPB Publication

**Online Resources:**

1. https://www.w3schools.com/
2. https://www.tutorialspoint.com/
3. https://www.programiz.com/
4. https://www.cprogramming.com/

| **Course Outcome** Practical - Fundamentals of Programming Language 'C' CPMNDSCAFC102 | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO -1** | **PO -2** | **PO -3** | **PO -4** | **PO -5** | **PO -6** | **PO -7** | **PO -8** | **PO -9** | **PO -10** | **PO -11** | **PO -12** | **PSO -1** | **PSO -2** |
| **CO-1** | 2 | 1 | | | | 3 | 3 | | | | | | | 2 |
| **CO-2** | 3 | | | | | 3 | 3 | | | | | | | |
| **CO-3** | | 3 | 3 | | | 2 | 3 | | | | | | | |
| **CO-4** | 2 | | | | | 3 | 3 | | | | | | 3 | |
| **CO-5** | 1 | | | | | | | | | | | | 3 | |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| Year : | 2023/24 | **Semester :** | I |
| **Course title :** | Practical – DBMS & Office | **Course code :** | CPMNDSCADB102A |
| **Course type :** | Practical | **Course credit :** | 02 |
| **Pre-requisite :** | Knowledge about Database Management System | | |
| **Rationale :** | DBMS helps to share the data Quickly, effectively and securely and also access the data vary fast with the accurate result.<br>It gives to knowledge to the student how the data can be stored and accessed. | | |

**Teaching Examination Scheme:**

| Teaching (Hours/week) | | | Examination Scheme | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 0 | 0 | 4 | 15 | 10 | 25 | 50 |

**Course Objective :**

1. Make access to the data easy for the user.
2. Protect Data From Physical harm and unauthorized systems.
3. Allow for growth in the data base system.

**Course Outcome:**

1. Evaluate the security and integrity of a database system
2. Analyze different types of database models (relational, hierarchical, network)
3. Apply normalization techniques to design and optimize database schemas
4. Explain the principles of database management systems in organizing and retrieving information.
5. Recognize fundamental concepts of databases, such as tables, records, fields, and keys and Memorize and list common terms used in database management.

## Content

**Practical:**

1. Essential Skills, Starting Microsoft Excel, Managing Workbook Files, Working in Workbooks, Selecting Cells and Choosing Commands, entering Data, Using Formulas to Calculate Values, Editing a Worksheet, formatting a Worksheet , Printing, Consolidating Data, Creating Charts (graphs ), Chart Types, Auto formats, Changing Data in a Chart, Formatting a Chart, Organizing and Analyzing Data in a List Using a List to Organize, data sorting and filtering Data in a List Summarizing Data in a List, Presenting, Reviewing, and Sharing Workbooks, Creating Graphic Objects on Worksheets and Charts, Auditing and Adding Comments to Documents, Protecting a Workbook, Exchanging Data with Other Applications, Sharing Data and Graphics with Other Applications, Importing and Exporting Documents, Switching from Other Applications.
2. Practical may be given to create

- Pivot table
- Macro facility
- Student mark sheet using formula & chart
- Salary sheet using formula & chart

**Database Tools**

3. Create a database with different data types using wizard.
4. Create relationship between two tables using keys (Primary key & Foreign Key)
5. Create report using wizard
6. Create student information system with insert, update, delete and view

**Reference Books:**

1. Database System Concepts: – Henry F. Korth&AbrahimSilberschatz –McGraw Hill Education
2. Introduction to database Management – Navin Prakash -TMH
3. Introduction to Database System C. J. Date (7 Edition) Low Price Edition
4. MS Office Fundamental & Internet

**Suggested Readings:**

1. Introduction to database Management – Navin Prakash -TMH

**Online Resources:**

1. https://www.geeksforgeeks.org/dbms
2. https://www.javatpoint.com/dbms-tutorial
3. https://www.tutorialspoint.com/dbms/index.htm

| **Course Outcome** | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Practical – DBMS & Office, CPMNDSCADB102A | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **PSO-1** | **PSO-2** |
| **CO-1** | 1 | | | | | 3 | 3 | | | | | | | |
| **CO-2** | | 3 | 2 | | 2 | | | 2 | | | | | | |
| **CO-3** | | | | | | | | 3 | | | | 1 | | |
| **CO-4** | 3 | | 2 | | | 1 | 3 | | | | | | 2 | |
| **CO-5** | | | | | | 2 | 3 | | | | | | 3 | |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| **Year :** | **2023/24** | **Semester :** | II |
| **Course title :** | Advance Programming Language 'C' | **Course code :** | CPMJDSCAPC201 |
| **Course type :** | Theory | **Course credit :** | 04 |
| **Pre-requisite :** | Basic Knowledge of Computer | | |
| **Rationale :** | To introduce students the essentials of computer Programming and programming methodology using C language | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 4 | 0 | 0 | 30 | 20 | 50 | 100 |

**Course Objective :**

1. Students will understand to formulate a computing problem to executable computer program using C language.
2. Students will understand about compiler based programming languages
3. Students will learn concepts of variables, literals, data types, conversions of data types, input and output data and processing of data, inbuilt functions, arrays, header files, conditional and iterative statements.

**Course Outcome:**

1. Develop C programs that interact with external resources, such as file, large-scale C programs that involve multiple modules and libraries.
2. Apply advanced concepts of C programming to solve complex problems.
3. Analyze and debug complex C programs for logical errors and memory leaks
4. Recall C programming syntax and language features like structure, UDF, File, pointer
5. Design and implement C programs with a focus on optimization and efficiency

## Content

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| **Unit – 1** | **Introduction to Function** | 1 | 25 % |
| | Concepts of Function, Types of Function, Prototype, Need for User define function, Classifications of function using arguments and return types , Nesting of functions, Recursion, Functions with arrays, The scope and lifetime of variables in functions | | |
| **Unit – 2** | **Pointer** | 1 | 25 % |
| | Introduction, Advantage of using pointer, Accessing the address of a variable, Declaring and initializing pointers, Accessing a variable through pointer, Pointer expressions, Pointer increments and scale factor, Pointers and arrays, Pointers and character strings, Pointers and Functions, Pointers and structures. | | |
| | **Dynamic Memory Allocation and Linked List** | | |
| | Introduction, Dynamic Memory allocation, Memory allocation functions (malloc, calloc) | | |
| **Unit – 3** | **Structures & Unions** | 1 | 25 % |
| | Introduction, defining a structure, Structure initialization, copying and Comparison of structures members, Arrays of structures, Arrays within structures, Structures within Structures, Structures and functions, Unions, Size of structures. | | |
| **Unit – 4** | **File Management in C** | 1 | 25 % |
| | Introduction, creating and opening a file, closing a file, Input / Output operations on files, Error handling during I/O operations, Random access files and Command line arguments | | |

**Reference Books:**

1. Programming in C, Balaguruswami – TMH
2. C: How to Program, Deitel & Deitel - PHI
3. C Programming Language, Kernigham & Ritchie – TMH

**Suggested Readings:**

1. Mastering Turbo C, Kelly & Bootle - BPB
2. C Language Programming – Byron Gottfried - TMH
3. Let us C, Yashwant Kanetkar - BPB Publication
4. Programming in C, Stephan Kochan - CBS
5. Magnifying C, Arpita Gopal - PHI

**Online Resources:**

1. https://www.w3schools.com/
2. https://www.tutorialspoint.com/
3. https://www.programiz.com/
4. https://www.cprogramming.com/

| Advance Programming Language 'C', CPMJDSCAPC201 | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **PSO-1** | **PSO-2** |
| **CO-1** | 3 | | 3 | | 2 | | 3 | | | | | | | 3 |
| **CO-2** | | | | 3 | | | | | | | | 3 | | 3 |
| **CO-3** | 3 | 2 | | | 2 | 3 | 3 | | | | | | | |
| **CO-4** | | | | | | 3 | | | | | | 2 | 2 | |
| **CO-5** | | | 3 | | | | | | | | | 3 | | 3 |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| **Year :** | **2023/24** | **Semester :** | II |
| **Course title :** | Practical –Advance Programming Language 'C' | **Course code :** | CPMJDSCAPC202 |
| **Course type :** | Practical | **Course credit :** | 02 |
| **Pre-requisite :** | Basic Knowledge of Computer | | |
| **Rationale :** | To introduce students the essentials of computer Programming and programming methodology using C language | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| 0 | 0 | 4 | Mid | CE | | |
| | | | 10 | 15 | 25 | 50 |

**Course Objective :**

1. Students will understand to formulate a computing problem to executable computer program using C language.
2. Students will understand about compiler based programming languages
3. Students will learn concepts of variables, literals, data types, conversions of data types, input and output data and processing of data, inbuilt functions, arrays, header files, conditional and iterative statements.

**Course Outcome:**

1. Develop C programs that interact with external resources, such as file, large-scale C programs that involve multiple modules and libraries.
2. Apply advanced concepts of C programming to solve complex problems.
3. Analyze and debug complex C programs for logical errors and memory leaks
4. Recall C programming syntax and language features like structure, UDF, File, pointer
5. Design and implement C programs with a focus on optimization and efficiency

## Practical List

**Practical:**

1. Write a program to check the given number is Palindrome or not using User Defined Function (UDF).
2. Write a program to find factorial of given no using UDF.
3. Write a program to find factorial of given no using recursion.
4. Write a program to display first 25 terms of Fibonacci series using recursion.
5. Write a program using a recursive function to find the GCD (Greatest Common Divisor) of two Positive integer numbers.
6. Write a program to swap value of two integer number using UDF.
7. Write a function prime that returns 1 if its argument is a prime and return zero Otherwise.
8. Write a program that uses a UDF to sort an array of integer.
9. Write a program which explains the use of nesting of functions.
10. Define a structure type struct personal that would contain person name, date of joining and salary using this structure to read this information and Display on screen.
11. Design a structure student_records to contain Roll_no, Name, City and Percentage obtained. Develop a program to read data for 5 students and Display them.
12. Write a program using structure within structure.
13. Write a program using structure within Function.
14. Write a program declare following structure member: name, code, age, weight and height. Read all members of the structure for 10 persons and find list of persons with all related data whose weight > 50 and height > 40 and print the same with suitable format and title.
15. Write a program to use of pointer in arithmetic operation.
16. Write a program to accept 10 numbers and display its sum using pointer.
17. Write a program to accept 10 numbers and sort them with use of pointer.
18. Write a program to swap the two values using pointers and UDF.
19. Write a program with structure and pointer.
20. Write a program using pointer to determine the length of a character string.
21. Write a program using pointers to read an array of integers and print its elements in reverse order.
22. Write a program using UDF and pointers to add two matrices and to return the resultant matrix to the calling function.

23. Create one text file store some information into it and print the same information on Terminal.
24. A file named data contains series of integer no. Write a c program to read that no. and then write all odd no into file named odd no. and write all even no into file named even no. Display all the contents of these file on screen.
25. Write a c program to read data from keyboard write it to a file called input and Display data of input file on the screen.
26. Write a program that counts the number of characters and number of lines in a file.
27. Two files DATA1 and DATA2 contain sorted lists of integers. Write a program to produce a third file DATA which holds a single sorted, merged list of these two lists. Use command line arguments to specify the file names.
28. Write a C program to work as a dos type command using command line argument.
29. Write a C program to work as a dos copy command using command line argument.
30. Write a program which explains the use of macro.

**Reference Books:**

1. Programming in C, Balaguruswami – TMH
2. C: How to Program, Deitel & Deitel - PHI
3. C Programming Language, Kernigham & Ritchie – TMH

**Suggested Readings:**

1. Mastering Turbo C, Kelly & Bootle - BPB
2. C Language Programming – Byron Gottfried - TMH
3. Let us C, Yashwant Kanetkar - BPB Publication
4. Programming in C, Stephan Kochan - CBS
5. Magnifying C, Arpita Gopal - PHI

**Online Resources:**

1. https://www.w3schools.com/
2. https://www.tutorialspoint.com/
3. https://www.programiz.com/
4. https://www.cprogramming.com/

| Practical –Advance Programming Language 'C', CPMJDSCAPC202 | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **PSO-1** | **PSO-2** |
| **CO-1** | 3 | | 3 | | 2 | | 3 | | | | | | | 3 |
| **CO-2** | | | | 3 | | | | | | | | 3 | | 3 |
| **CO-3** | 3 | 2 | | | 2 | 3 | 3 | | | | | | | |
| **CO-4** | | | | | | 3 | | | | | | 2 | 2 | |
| **CO-5** | | | 3 | | | | | | | | | 3 | | 3 |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| **Year :** | **2023/24** | **Semester :** | II |
| **Course title :** | Practical – Web Design | **Course code :** | CPMJDSCAWD202A |
| **Course type :** | Practical | **Course credit :** | 02 |
| **Pre-requisite :** | Basic knowledge of internet | | |
| **Rationale :** | Students will develop and understanding of information design web page and usability as it applies to interactive media projects. | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 0 | 0 | 4 | 10 | 15 | 25 | 50 |

**Course Objective :**

1. Learn about E-Services like E-Banking, E-Learning etc.
2. Understanding the basic concept of HTML tags.
3. Learn the language of the web: HTML and CSS.
4. Develop skills in analyzing the usability of a web site.

**Course Outcome:**

1. Demonstrate proficiency in creating well-structured web pages using HTML for content and CSS for styling.
2. Remember fundamental principles of web design, including HTML tags, CSS properties, and basic scripting concepts.
3. Apply web design principles to create a basic website. Implement interactive features using JavaScript.
4. Evaluate the reliability of internet sources. Assess the effectiveness of security measures in a network

**Practical List**

1. Develop an HTML document for a web page of your favorite teacher. Design the page with an attractive background color, text color and background image.
2. Develop an HTML document for a web page of your favorite National Leader. Design the page with an attractive color combination, with suitable headings and horizontal rules.
3. Develop an HTML document for a web page of your favorite teacher. Design the page with an attractive background color, text color and background image.
4. Develop an HTML document for a web page of your favorite National Leader. Design the page with an attractive color combination, with suitable headings and horizontal rules.
5. Write an HTML document with an example of Ordered List and Unordered List.
6. Write an HTML document with an example of Ordered List and Unordered List Using Nested list.
7. Write an HTML document with an example of Table format to print your Bio-Data.
8. Write an HTML document to create complex Table like Telephone Bill, Mark sheet, Time-table.
9. Write the Frameset tags and Frame tags for the following frameset.

<table>
<tr><td>Physics.html</td><td rowspan="2">Welcome.html</td><td>Maths.html</td></tr>
<tr><td>Chemistry.html</td><td rowspan="2">Computer.html</td></tr>
<tr><td>Biology.html</td><td rowspan="2">Heading.html</td></tr>
<tr><td>Zoology.html</td><td>Account.html</td></tr>
</table>

10. Develop a complete web page using Frames and Frameset which gives the Information about Hospital.
11. Write an HTML code for designing the subscription form of mail account in the e-mail Website with appropriate fields.
12. Write an example of External Stylesheet.
13. Write HTML program which contains Inline Style sheet for <p>, <h1> and <body> tags.
14. Write HTML program which contains Internal Style sheet for <p>, <h1> and <body>tags.
15. Describe yourself on a webpage and experiment with colors in bicolor, text, and link, try out different and sizes and also the other tags you studies so far, such as the rules tag as wells.
16. Write HTML code to develop a web page having background in blue and title "Well

come to my home page" in red other color.

17. Create an HTML document of giving details of your name, age, telephone no, address and enrolment no, aligned in proper order.
18. Calculate a web page that provides links to five different web page or to entirely different websites.
19. Write a HTML code for making table to containing different option for different questions.
20. Write HTML program which contains Internal Style sheet for <p>, <h1> and <body>tags.
21. Describe yourself on a webpage and experiment with colors in bicolor, text, and link, try out different and sizes and also the other tags you studies so far, such as the rules tag as wells.
22. Write HTML code to develop a web page having background in blue and title "Well come to my home page" in red other color.
23. Create an HTML document of giving details of your name, age, telephone no, address and enrolment no, aligned in proper order.
24. Calculate a web page that provides links to five different web page or to entirely different websites.
25. Write a HTML code for making table to containing different option for different questions.

**Reference Books:**

1. Internet and Web DesignBased on DOEACC III Revised syllabus 'O' Level - Mac Millan India Ltd
2. Teach Yourself HTML 4 in 4 Hours By Dick Oliver – Tech Media 4th Edition
3. Introduction To Internet And HTML Scripting-Fourth Edition-Bhaumik Shroff

**Suggested Readings:**

1. Introduction To Internet And HTML Scripting-Fourth Edition-Bhaumik Shroff

**Online Resources:**

1. https://www.tutorialspoint.com/internet_technologies/internet_overview.htm
2. https://www.w3schools.com/html/
3. https://www.w3schools.com/w3css/defaulT.asp
4. https://www.geeksforgeeks.org/javascript/

| **Course Outcomes**<br><br>Practical – Web Design,<br><br>CPMJDSCAWD202A | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **PSO-1** | **PSO-2** |
| **CO-1** | 1 | | 2 | | 3 | 2 | 3 | | | | | | | |
| **CO-2** | 2 | | 3 | | | 3 | 3 | | | | | | 3 | |
| **CO-3** | 1 | | 3 | | 2 | | 2 | | | | 2 | | | 3 |
| **CO-4** | 2 | | | | | | | | | 1 | | | | |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| **Year :** | **2023/24** | **Semester :** | II |
| **Course title :** | Internet & Web Design | **Course code :** | CPMJDSCAHM201A |
| **Course type :** | Theory | **Course credit :** | 04 |
| **Pre-requisite :** | Basic knowledge of internet | | |
| **Rationale :** | Students will develop and understanding of information design web page and usability as it applies to interactive media projects. | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 4 | 0 | 0 | 30 | 20 | 50 | 100 |

**Course Objective :**

1. Learn about E-Services like E-Banking, E-Learning etc.
2. Understanding the basic concept of HTML tags.
3. Learn the language of the web: HTML and CSS.
4. Develop skills in analyzing the usability of a web site.

**Course Outcome:**

1. Demonstrate proficiency in creating well-structured web pages using HTML for content and CSS for styling.
2. Remember fundamental principles of web design, including HTML tags, CSS properties, and basic scripting concepts.
3. Apply web design principles to create a basic website. Implement interactive features using JavaScript.
4. Evaluate the reliability of internet sources. Assess the effectiveness of security measures in a network

## Content

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | **Introduction to Internet**<br>Introduction, Evaluation of Internet, Internet Service, Computer Networks, Internet, URL (Uniform Resource Locator), Internet Service Provider, Intranet, Extranet, Virtual Private Network, World Wide Web, Search Engines, News groups, Electronic Mail, Web Portal, Chat, Video Conferencing, FTP, Remote Login, E-Commerce, E-Learning, E-Governance, E-Banking Difference between Internet, Intranet, Extranet, Internet Protocols (TCP,IP, UDP, FTP, HTTP), ISP (Internet Service Provider), E-mail, E-Learning, E-Banking, E-Governance, Social Networking, Instant Massaging, Audio and Video Conferencing, Data Encryption & Decryption, Concepts of Digital Signature, Concepts about Firewall Security | 1 | 25 % |
| II | **HTML**<br>HTML tag, Web Page and its Types, Publishing HTML Pages, Basic Tags.<br>HTML document Structure, adding text in Newline<BR>, Creating heading: <H1> to <H6>,Creating a paragraph<P>--</P>, Creating a Horizontal ruler<HR>--</HR>, Scrolling text <marquee>-- </marquee>, Linking to other page :< a> and <link> tags, Text fomenting tags, Font tag with attribute, Working with List tags<OL> and <UL>,Creating Table: Related tags with attribute, Creating HTML From with adding controls, Frame and frameset tag, Putting Graphics on a Web page, Custom Background and colors. | 1 | 25 % |
| III | **Introduction to Cascading Style Sheet**<br>Concepts of workbook, Defining Style with HTML tags, Features of Style sheet, Types of Style Sheets: External, Internal, and Inline, Style Properties, Style Class & ID Selector. | 1 | 25 % |

| | | | |
|---|---|---|---|
| IV | **Introduction to Java Script**<br>Writing First Java Script, HTML and Java script, Variables: Rules for variable names, declaring the variable, assign a value to a variable, Scope of variable, Using Operators, Control Statements, JavaScript loops. Types of JavaScript: External, Internal. JavaScript Functions: Defining a Function, Returning value from function, User Define Function. | 1 | 25 % |

**Reference Books:**

1. Internet and Web DesignBased on DOEACC III Revised syllabus 'O' Level - Mac Millan India Ltd
2. Teach Yourself HTML 4 in 4 Hours By Dick Oliver – Tech Media 4th Edition
3. Introduction To Internet And HTML Scripting-Fourth Edition-Bhaumik Shroff

**Suggested Readings:**

1. Introduction To Internet And HTML Scripting-Fourth Edition-Bhaumik Shroff

**Online Resources:**

1. https://www.tutorialspoint.com/internet_technologies/internet_overview.htm
2. https://www.w3schools.com/html/
3. https://www.w3schools.com/w3css/defaulT.asp
4. https://www.geeksforgeeks.org/javascript/

| **Course Outcomes**<br><br>Internet & Web Design, CPMJDSCAHM201A | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **PSO-1** | **PSO-2** |
| **CO-1** | 1 | | 2 | | 3 | 2 | 3 | | | | | | | |
| **CO-2** | 2 | | 3 | | | 3 | 3 | | | | | | 3 | |
| **CO-3** | 1 | | 3 | | 2 | | 2 | | | | 2 | | | 3 |
| **CO-4** | 2 | | | | | | | | | 1 | | | | |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| **Year :** | **2023/24** | **Semester :** | II |
| **Course title :** | Computer Networks | **Course code :** | CPMNDSCACN202 |
| **Course type :** | Theory | **Course credit :** | 04 |
| **Pre-requisite :** | The students should have a basic Understanding of computer Network ,Models and Layer. | | |
| **Rationale :** | It gives information to students which gives the means of interconnectivity for a computer's hardware components as well as the mode of data transfer and processing exhibited. | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 4 | 0 | 0 | 30 | 20 | 50 | 100 |

**Course Objective :**

1. To understand the data and database management of computer system.
2. To identify and compare different method for computer I/O.
3. Identify and understand the models.

**Course Outcome:**

1. Recall basic terms and concepts related to computer networks, such as protocols, OSI model layers, and network topologies.
2. Interpret the principles behind networking protocols and technologies.
3. Apply networking knowledge to solve problems or configure network devices.
4. Assess the security, performance, and efficiency of computer networks.
5. Design and implement computer networks based on specific requirements

## Content

| Unit | Basic concepts of Database Systems | Credit | Weightage |
|---|---|---|---|
| I | Introduction of Computer Networks,<br>Uses of Computer Networks, Advantage & Disadvantage of Computer Networks<br>Transmission mode: Simplex communication, Half-duplex and Full-duplex<br>Introduction of Internet & Intranet, Baseband & Broadband Transmission | 1 | 25 % |
| II | ✓ Network Hardware: PAN (Personal Area Network) , LAN (Local Area Network), MAN (Metropolitan Area Network), WAN (Wide Area Network)<br>✓ The Internet (network of all networks)<br>✓ Network Topology: Linear bus, Ring, Star, tree, mesh & Hybrid.<br>✓ Reference Model: OSI Reference Model & TCP/IP Reference Model, Comparison of OSI reference model<br>✓ Connecting Devices: Repeater, HUB, Switch, Bridge, Router, and Gateway.<br>✓ The Telephone System – its structure, the local loop, transmission Impairments<br>Introduction of Modem, Introduction of Communication satellites. | 1 | 25 % |
| III | Guided Media - Twisted Pair, coaxial cable, Fiber optics. Unguided transmission media - Radio wave, micro wave and infrared, Multiplexing – FDM, TDM, WDM. Switching – Circuit switching, Message Switching, Packet switching. | 1 | 25 % |
| IV | Design Issues - Framing, Error control, Flow control, Error detection and correction. Elementary data link protocols - Simplex, stop and wait, sliding window protocol - Go Back N, Selective repeat.<br>**The Medium Access Control Sublayer:** The channel allocation problem, Multiple Access protocols – CSMA/CD, CSMA/CA | 1 | 25 % |

| | | | |
|---|---|---|---|
| | | | |

**Reference Books:**

1. 1 Data Communication & Networking by Behrouz A. Forouzan, Tata McGraw Hill Edition
2. Computer network, Andrew S. Tanenbaum, fourth edition, Pearson
3. TCP/IP Protocol Suit by Behrouz A. Forouzan, Tata McGraw Hill Edition.

**Suggested Books:**

1. Computer network, Andrew S. Tanenbaum, fourth edition, Pearson

**Online Resources:**

1. https://www.tutorialspoint.com/computer_fun damentals/computer_networking.htm
2. https://www.tutorialspoint.com/data_communication_computer_network/data_communication_computer_network/data_communication_computer_network_tutorial.pdf

| **Course Outcomes** COMPUTER NETWORK CPMNDSCACN202 | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **PSO-1** | **PSO-2** |
| **CO-1** | 3 | | | | | 3 | 3 | | | | | | 2 | |
| **CO-2** | | | | | | 3 | | | | | | | | |
| **CO-3** | | | 1 | | 2 | | 2 | | | 2 | | | 3 | |
| **CO-4** | 3 | | | | | 2 | | | | 2 | | | | |
| **CO-5** | | | 2 | | 1 | | | | | | | | | |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| **Year :** | **2023/24** | **Semester :** | II |
| **Course title :** | SYSTEM ANALYSIS | **Course code :** | CPMDCASA203 |
| **Course type :** | Theory | **Course credit :** | 04 |
| **Pre-requisite :** | The purpose of the system requirements analysis is to structure the system independent of any implementation environment. This phase can determine system behavior and limitations | | |
| **Rationale :** | This course mainly focuses on different of system analysis and design such as foundation , planning, analysis, design, implementation, and maintenance. | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 4 | 0 | 0 | 30 | 20 | 50 | 100 |

**Course Objective :**

1. Define system
2. Explain different phase of SDLC and their use
3. Design system component and environment
4. Analyze and specify the requirements of system

**Course Outcome:**

1. Design a complete system solution, including detailed system specifications, data models.
2. Evaluate the feasibility of proposed systems based on technical, operational, and economic factors.
3. Apply different system modeling techniques, such as data modeling and process modeling, to represent and analyze system requirements.
4. Explain the principles of system analysis and design methodologies, including their purpose and relevance in software development.
5. Recall basic concepts related to system analysis and design, such as the SDLC (Software Development Life Cycle), data flow diagrams, and entity-relationship diagrams.

## Content

| Unit | Description in detail | Credit | Weightage |
|---|---|---|---|
| I | Introduction to System, System Analysis and Design, Need for System Analysis and Design, Types of System, Role of the System Analyst.<br><br>**System Development Strategies**: SDLC, Structured Analysis Development Method, System Prototype Method.<br><br>**Fact-Fining Techniques**: Interview, Questionnaire, Record Review, Observation. Data Flow Diagram: Advantages, Notations, Rules, Logical and Physical DFD. Data Dictionary: Importance and detail<br><br>**Structured Decisions:** Decision Tree, Decision Tables, Structured English | 1 | 25 % |
| II | **Code Design**: Principle of Code Design, Types of code<br><br>**Output**: Principle of output, types of output, output media<br><br>**Form Designing**: Objectives, Guideline for Form design, Types of form<br><br>**Designing User Interface**: Objectives, Types of user interface Check Digits, Data Validation and Data Verification<br><br>**Case Tools**: Benefits of Computer-Assisted Tools, Categories of Automated Tools, Case Components. | 1 | 25 % |
| III | System Engineering Definition, Quality assurance: definition and need<br>**Design of software:** Importance, Software design principles<br><br>**Software design and documentation tools:** Structure Flowchart, HIPO, Warier /Orr Diagrams.<br><br>**System key concepts**: Testing, System conversion, Documentation. | 1 | 25 % |
| IV | Financial Accounting System, Payroll System, Library System, Inventory / Stock System | 1 | 25 % |

**Reference Books:**

1. Analysis & Design of Information Systems, James A. Sen
2. System Analysis & Design, 1st Edition, Parthasarathy &B.W.Khalkar

**Suggested Books:**

1. Introduction to S.A.D, LEE VOL. 1 & 2

**Online Resources:**

1. https://www.tutorialspoint.com/system_analysis_and_design/system_analysis_and_design_quic k_guide.htm
2. https://study.com/academy/course/computer-science-302-system-analysis-design.html

| **Course Outcomes**<br><br>System Analysis, CPMDCASA203 | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **PSO-1** | **PSO-2** |
| **CO-1** | | | 3 | | 3 | | | | | | | | | |
| **CO-2** | | 3 | | | | | | 2 | | | | | | |
| **CO-3** | | | | | 3 | | | 2 | | | | 2 | 2 | |
| **CO-4** | | | | | | 2 | 3 | | | 2 | | | 3 | |
| **CO-5** | | | 3 | | | | 1 | 2 | | | | | | |

| | | | |
|---|---|---|---|
| **Program:** | BCA | **Subject / Branch:** | NA |
| **Year:** | **2023/24** | **Semester:** | II |
| **Course title:** | Adv. Mathematics | **Course code:** | CPSECAMT206 |
| **Course type:** | Theory | **Course credit:** | 2 |
| **Pre-requisite :** | Have basic knowledge of maths | | |
| **Rationale :** | By contrast, math in particular counting and probability allows students-even at the middle-school level-to very quickly explore non-trivial ”real world” problems that are challenging and interesting. | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 2 | 0 | 0 | 15 | 10 | 25 | 50 |

**Course Objective:** Identify the number of rows and columns within a matrix. Solve a system of linear equations by row-reducing its augmented form. Understand the nature of a logical argument and mathematical proof and be able to produce examples of these.

**Course Outcome:** After completion of the course students are expected to be able to:

1. Determine whether or not a given matrix is invertible and if is, find its inverse.
2. Perform the matrix operations of addition, multiplication and express a system of simultaneous linear equation in matrix form.
3. Determine if an infinite sequence is bounded, monotonic or oscillating
4. Recall basic set theory, Function, Matrices and Determinants, Sequence and Series

| Unit | Matrices and Determinants | Credit | Weightage |
|---|---|---|---|
| **Unit -1** | **Set Theory** | 1 | 25 % |
| | Definition and notation of Set, Methods of representation of set (Property and List Method), set of numbers (Natural, Integers, Rational, Irrational, Real), Definition: Finite set, Infinite set, Empty set, Singleton set, Subset, Proper, subset of a set, Power set, Universal set, Complement of a set, Cardinality of set, Venn Diagrams, Set Operations: Union of two sets, Intersection of two sets, Disjoint sets, Equality of sets, Equivalent sets, Difference set, Symmetric Difference set, Properties of set operations (Cartesian product of sets Commutative, Associative, Distributive, De-Morgan's laws) | | |
| **Unit – 2** | **Function** | **1** | 25 % |
| | Introduction of Function, Definition of function, Domain, Co-domain, Image and Range of function, Types of function(with example): Linear, Quadratic, Polynomials, Rational, Irrational, Single value and Many value, Even and Odd, Explicit and Implicit, The Classification of functions: one-one, many-one, onto, into function, Evaluation of function, Composition of functions, Identity function, Mathematical functions (Definition with example): Floor and Ceiling function, Integer and Absolute value function, Remainder function, Exponential function, logarithm function and its properties, Recursive function. | | |

**Reference Books:**

1. Discrete Mathematics -Revised 3rd Edition Authors: **Seymour Lipschutz** and **Marc Lars Lipson,** Publication: McGraw-Hill Education (India) Pvt Limited
2. Elements of Discrete Mathematics -3rd Edition Authors: Chung Laung Liu and Durga Prasad Mohapatra Publication: McGraw-Hill Education (India) Pvt Limited
3. Discrete Mathematics -3rd Edition Author: J. K. Sharma

| **Course Outcomes** Adv. Mathematics CPSECAMT206 | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **PSO-1** | **PSO-2** |
| **CO-1** | 3 | 2 | | | | | | | | | | | | |
| **CO-2** | | | | | | 3 | 2 | | | | | | | |
| **CO-3** | 2 | 1 | | | | | | | | | | | | |
| **CO-4** | | 2 | | | | 3 | 3 | | | 1 | | | 2 | |

| | | | |
|---|---|---|---|
| **Program :** | BCA | **Subject / Branch :** | NA |
| **Year :** | **2023/24** | **Semester :** | II |
| **Course title :** | Communication Skills | **Course code :** | CPAECACS204 |
| **Course type :** | Theory | **Course credit :** | 02 |
| **Pre-requisite :** | Basic Knowledge of English Language | | |
| **Rationale :** | To make the students confident and make them aware about their personality development. | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 2 | 0 | 0 | 15 | 10 | 25 | 50 |

**Course Objective :**

Students will develop their confidence.
Students will understand the importance of personality development and self awareness.
Students understand the importance of language and learn different techniques of interview, presentation etc.

**Course Outcome:**

1. Demonstrate the ability to articulate ideas clearly and confidently in spoken form.
2. Develop active listening skills, enabling them to comprehend and respond appropriately to various communication cues.
3. Enhance their written communication skills, producing clear, concise, and organized written documents.
4. Evaluate the effectiveness of different communication methods.

## Content

| Unit | Theory of Communication | Credit | Weightage |
|---|---|---|---|
| I | **Business Communication**<br>➔ Application for Job<br>➔ Loan<br>➔ Leave<br>➔ Demanding Original Documents from Office<br>➔ Business Letters for Inquiry<br>◆ Reply<br>◆ Quotation<br>◆ Placing of Order<br>◆ Complaint<br>◆ Adjustment<br>➔ Comprehension<br>➔ Paragraph Writing | 1 | 25 % |
| II | **Listening and Speaking**<br>➔ Importance of Listening<br>➔ Listening Process<br>➔ Barriers of Listening<br>➔ Speech preparation<br>➔ Guidelines for Effective Speaking<br>➔ Group discussion<br>➔ Interview – types and preparation | 1 | 25 % |

**Reference Books:**

4. Communication Skills – Vithal Patel
5. English Grammar Composition and Effective Business Communication- Pink and Thomas – S. Chand

**Suggested Readings:**

1. Story books to increase vocabulary.
2. Listen Motivational videos.
3. Read interested area in English News Papers.

**Online Resources:**

1. https://learnenglish.britishcouncil.org/grammar-reference
2. https;//en.m.wikipedia.org/communication

| **Course Outcomes** Communication Skills CPAECACS204 | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **PSO-1** | **PSO-2** |
| **CO-1** | | | | | | 2 | 3 | | 3 | | 3 | | | |
| **CO-2** | | | | | | | | | 3 | 1 | | | | |
| **CO-3** | | 2 | | | | | | | | | | 2 | | |
| **CO-4** | | | | | | | | | 3 | | | | | |

# Gokul Global University, Siddhpur

## FACULTY OF COMPUTER SCIENCE AND APPLICATIONS

| | | | |
|---|---|---|---|
| **Program:** | BCA | **Subject / Branch:** | NA |
| **Year:** | 2023/24 | **Semester:** | II |
| **Course title:** | Environmental Studies | **Course code:** | CPVACAES205 |
| **Course type:** | Theory | **Course credit:** | 2 |
| **Prerequisite:** | Environmental studies require an interdisciplinary approach, drawing from fields such as biology, chemistry, geography, sociology, and economics to comprehend the complex interactions between humans and the environment. | | |
| **Rationale:** | The importance of environmental studies is describes: Clarification of modern environmental concept like how to conserve biodiversity. | | |

**Teaching Examination Scheme:**

| **Teaching (Hours/week)** | | | **Examination Scheme** | | | |
|---|---|---|---|---|---|---|
| Lecture | Tutorial | Practical | Internal | | External | Total |
| | | | Mid | CE | | |
| 2 | 0 | 0 | 10 | 15 | 25 | 50 |

**Course Objective:**

1. Inculcate environmental awareness as well as values in the students and translating them into pro- conservation actions.

**Course Outcome:**

1.Recall and identify key environmental concepts, theories, and terminology
2. Apply environmental principles to analyze real-world environmental problems.
3.Examine the factors contributing to a specific environmental issue.
4. Memorize key facts related to environmental issues such as pollution types.

## Content

| Unit | **Introduction to Environment**: | Credit | Weightage |
|---|---|---|---|
| **Unit – 1** | Definition and Components of Environment<br>Human Environment<br>Environmental Studies<br>Man and Environment relationship<br>➔ Man,Environment and Religion<br>➔ Impact of technology on Environment<br>Environmental Problems and causes<br><br>**Human Population and Environment:**<br>Population Growth,<br>World and Indian scenario,<br>Population and Environmental Degradation,<br>Population explosion – Causes, Effects and Control.<br>**Urbanization**: Urban population growth and Environmental problems. | 1 | 25 % |
| **Unit – 2** | **Environmental Pollution:**<br>**Water Pollution:** Introduction, Water Quality Standards, Sources of Water Pollution: Industrial,Agricultural, Municipal; Classification of water pollutants,Effects of water pollutants<br>**Air Pollution:** Composition of air, Structure of atmosphere, Ambient Air Quality Standards,Classification of air pollutants, Sources of common air pollutants,Effects of common air pollutants.<br>**Noise Pollution:** Introduction, Sound and Noise,Causes and Effects<br>**Land Pollution:** Land uses, Land degradation: causes, effects and control<br>**Global Environmental Issues:** Climate Change, Global Warming and GreenHouse Effect, Acid Rain | 1 | 25 % |

**Reference Books:**

1. A Text Book of Environmental Studies: A Comprehensive Study of Environment and Ecology
2. Environmental Sciences by Daniel B Botkin & Edward A Keller Publisher: John Wiley &Sons.

**Suggested Readings:**

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha Second edition,2013 Publisher: Universities Press (India) Private Ltd, Hyderabad.
2. Textbook of Environmental Studies by Deeksha Dave & SSKateva, CengagePublishers.
3. Environmental Sciences by Daniel B Botkin & Edward A Keller Publisher: John Wiley &Sons.

**Online Resources:**

1. **http://earlham.worldcat.org/oclc/46685085**
2. **http://earlham.worldcat.org/oclc/31901190**

| **Course Outcomes** Environmental Studies CPVACAES205 | **Expected Mapping with Programme Outcomes (1- Weak Correlation; 2- Medium correlation; 3- Strong Correlation)** | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **PO-1** | **PO-2** | **PO-3** | **PO-4** | **PO-5** | **PO-6** | **PO-7** | **PO-8** | **PO-9** | **PO-10** | **PO-11** | **PO-12** | **PSO-1** | **PSO-2** |
| **CO-1** | | 1 | | | | 3 | 1 | | | 1 | | | | |
| **CO-2** | | 2 | | | | 1 | | | | | | | | |
| **CO-3** | | | | | | | 3 | | | 3 | | | | |
| **CO-4** | | | | | | | 2 | | | 1 | | | | |

# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

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Program Name *

BACHELOR OF ARTS

Academic Year *

- ○ 2023-24

Department *

B.A GUJARATI

Curriculum is Relevance to Programme. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum have Local, National and Global impact *

- ◉ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Opportunity for developing skills in the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum outcome is well define. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have choice based elective subject option. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Easy availability of study materials and e-content related curriculum. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

curriculum have Professional ethics and Human values. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

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Program Name *

BACHELOR OF ARTS

Academic Year *

- [ ] 2023-24

Department *

B.A. PSYCHLOGY

Curriculum is Relevance to Programme. *

- [x] Strongly agree
- [ ] Agree
- [ ] Neutral
- [ ] Disagree
- [ ] Strongly Disagree

Curriculum have Local, National and Global impact *

- [ ] Strongly agree
- [x] Agree
- [ ] Neutral
- [ ] Disagree
- [ ] Strongly Disagree

Opportunity for developing skills in the curriculum. *

- ○ Strongly agree
- ○ Agree
- ◉ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum outcome is well define. *

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- ○ Disagree
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Easy availability of study materials and e-content related curriculum. *

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- ○ Strongly Disagree

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- ○ Agree
- ○ Neutral
- ○ Disagree
- ◉ Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

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Program Name *

MASTER OF ARTS

Academic Year *

- [ ] 2023-24

Department *

B.A. PSYCHLOGY

Curriculum is Relevance to Programme. *

- [ ] Strongly agree
- [x] Agree
- [ ] Neutral
- [ ] Disagree
- [ ] Strongly Disagree

Curriculum have Local, National and Global impact *

- [ ] Strongly agree
- [x] Agree
- [ ] Neutral
- [ ] Disagree
- [ ] Strongly Disagree

Opportunity for developing skills in the curriculum. *

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- ○ Disagree
- ○ Strongly Disagree

Curriculum outcome is well define. *

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- ○ Strongly Disagree

Easy availability of study materials and e-content related curriculum. *

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- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

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Program Name *

BAMS

Academic Year *

- (●) 2023-24

Curriculum is Relevance to Programme. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Opportunity for developing skills in the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum outcome is well define. *

- ( ) Strongly agree
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- ( ) Neutral
- ( ) Disagree
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curriculum have choice based elective subject option. *

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- ( ) Disagree
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- ○ Disagree
- ○ Strongly Disagree

Relevance of the  Curriculum for providing employability. *

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- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

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- ◉ Strongly agree
- ○ Agree
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- ○ Disagree
- ○ Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

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sandipsinhrajput05@gmail.com

Program Name *

BAMS

Academic Year *

- (●) 2023-24

Curriculum is Relevance to Programme. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Opportunity for developing skills in the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum outcome is well define. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have choice based elective subject option. *

- ( ) Strongly agree
- ( ) Agree
- (●) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Easy availability of study materials and e-content related curriculum. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

curriculum have Professional ethics and Human values. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Chaudhary nehal devrajbhai

Enrollment No. *

FAB2201001011

Mobile No. *

9327486189

Email id *

nehalchaudhary9974@gmail.com

Program Name *

BAMS

Academic Year *

- (●) 2023-24

Curriculum is Relevance to Programme. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Opportunity for developing skills in the curriculum. *

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- ○ Disagree
- ○ Strongly Disagree

Remarks (if any)

.....

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Google Forms

# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Patel DiyaKumari Hasmukhbhai

Enrollment No. *

FAB2201001036

Mobile No. *

8799006001

Email id *

pdiya1505@gmail.com

Program Name *

BAMS

Academic Year *

- (●) 2023-24

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- ( ) Strongly agree
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Opportunity for developing skills in the curriculum. *

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- ○ Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Trivedi janviben shaileshbhai

Enrollment No. *

FAB2201001057

Mobile No. *

9265638001

Email id *

trivedijanvi73@gmail.com

Program Name *

BAMS

Academic Year *

- (●) 2023-24

Curriculum is Relevance to Programme. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
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Opportunity for developing skills in the curriculum. *

- ○ Strongly agree
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Curriculum outcome is well define. *

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Remarks (if any)

.....

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Google Forms

# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Student Name *

2. Enrollment No. *

3. Mobile No. *

4. Email id *

5. Program Name *

*Mark only one oval.*

- BAMS

6. Academic Year *

*Mark only one oval.*

- 2023-24

7. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

8. Curriculum have Local, National and Global impact *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

9. Opportunity for developing skills in the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

10. Curriculum outcome is well define. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

11. curriculum have choice based elective subject option. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

12. Easy availability of study materials and e-content related curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

13. Relevance of the Curriculum for providing employability. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

14. curriculum have Professional ethics and Human values. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

15. Remarks (if any)

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Nareshsenma

Enrollment No. *

23000502003

Mobile No. *

9925978549

Email id *

nareshsenma07@gmail.com

Program Name *

MASTER OF COMMERCE

Academic Year *

- (●) 2023-24

Department *

COMMERCE & MANAGEMENT

Curriculum is Relevance to Programme. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Opportunity for developing skills in the curriculum. *

- ○ Strongly agree
- ○ Agree
- ◉ Neutral
- ○ Disagree
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Curriculum outcome is well define. *

- ◉ Strongly agree
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curriculum have choice based elective subject option. *

- ◉ Strongly agree
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Easy availability of study materials and e-content related curriculum. *

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Relevance of the Curriculum for providing employability. *

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- ○ Agree
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- ◉ Disagree
- ○ Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

PANCHAL VISHALBHAI SURESHBHAI

Enrollment No. *

24000504094

Mobile No. *

9638007639

Email id *

panchalvishal944@gmail.com

Program Name *

MASTER OF BUSINESS ADMINISTRATION

Academic Year *

- (●) 2023-24

Department *

COMMERCE & MANAGEMENT

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- (●) Strongly agree
- ( ) Agree
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Opportunity for developing skills in the curriculum. *

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Curriculum outcome is well define. *

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curriculum have choice based elective subject option. *

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Easy availability of study materials and e-content related curriculum. *

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Relevance of the  Curriculum for providing employability. *

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- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

Good

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

vineet devnani

Enrollment No. *

24000503015

Mobile No. *

9512130269

Email id *

devnanivineet@gmail.com

Program Name *

BACHELOR OF BUSINESS ADMINISTRATION

Academic Year *

- (●) 2023-24

Department *

COMMERCE & MANAGEMENT

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

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Remarks (if any)

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Student Name *

2. Enrollment No. *

3. Mobile No. *

4. Email id *

5. Program Name *

*Mark only one oval.*

- Bachelor of Computer Applications(BCA)
- Bachelor of Science in Information Technology(B.SC.IT.)
- Master of Computer Application(MCA)
- Master of Science in Information Technology(M.SC.IT.)
- Post Graduate Diploma in Computer Application(PGDCA)

6. Academic Year *

*Mark only one oval.*

- 2023-24

7. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

8. Curriculum have Local, National and Global impact *

*Mark only one oval.*

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- Agree
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- Disagree
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9. Opportunity for developing skills in the curriculum. *

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- Strongly Disagree

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- Agree
- Neutral
- Disagree
- Strongly Disagree

13. Relevance of the Curriculum for providing employability. *

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- Strongly agree
- Agree
- Neutral
- Disagree
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- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

15. Remarks (if any)

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Google Forms

# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Mahinm Kashyapbhai Purohit

Enrollment No. *

FEB2200104343

Mobile No. *

8511247038

Email id *

mahimnrajpurohit@gmail.com

Program Name *

Bachelor of Engineering

Academic Year *

- (●) 2023-24

Department *

Computer Engineering

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- (●) Strongly agree
- ( ) Agree
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Opportunity for developing skills in the curriculum. *

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Relevance of the  Curriculum for providing employability. *

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Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Shukla Chaitanya

Enrollment No. *

FEB2200104311

Mobile No. *

9426397095

Email id *

Chaitanyashukla2000@gmail.com

Program Name *

Bachelor of Engineering

Academic Year *

- (●) 2023-24

Department *

Computer Engineering

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
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Curriculum have Local, National and Global impact *

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Remarks (if any)

.....

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Google Forms

# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Parmar Mohammad siddik javed bhai

Enrollment No. *

24000101011

Mobile No. *

7383821590

Email id *

Sddkparmar@gmail.com

Program Name *

Bachelor of Engineering

Academic Year *

- (●) 2023-24

Department *

Civil Engineering

Curriculum is Relevance to Programme. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

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Remarks (if any)

Good

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Panchal Himanshu Mukeshbhai

Enrollment No. *

FEB2200102335

Mobile No. *

9023085570

Email id *

Himanshupanchal668@gmail.com

Program Name *

Bachelor of Engineering

Academic Year *

- (●) 2023-24

Department *

Mechanical Engineering

Curriculum is Relevance to Programme. *

- ( ) Strongly agree
- ( ) Agree
- (●) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

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Opportunity for developing skills in the curriculum. *

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Remarks (if any)

Good

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Charmi Modi

Enrollment No. *

FEB2200103330

Mobile No. *

8160142141

Email id *

modicharmi2000@gmail.com

Program Name *

Bachelor of Engineering

Academic Year *

- (●) 2023-24

Department *

Electrical Engineering

Curriculum is Relevance to Programme. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

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Opportunity for developing skills in the curriculum. *

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- ○ Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

NAGORI HAIYAN NAIMKHAN

Enrollment No. *

FEB2200102330

Mobile No. *

6352562590

Email id *

haiyannagori@gmail.com

Program Name *

Bachelor of Engineering

Academic Year *

- (●) 2023-24

Department *

Mechanical Engineering

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Opportunity for developing skills in the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum outcome is well define. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have choice based elective subject option. *

- (●) Strongly agree
- ( ) Agree
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- ( ) Disagree
- ( ) Strongly Disagree

Easy availability of study materials and e-content related curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Student Name *

2. Enrollment No. *

3. Mobile No. *

4. Email id *

5. Program Name *

*Mark only one oval.*

- ◯ Master of Engineering
- ◯ Bachelor of Engineering
- ◯ Diploma Engineering

6. Academic Year *

*Mark only one oval.*

- 2023-24

7. Department *

*Mark only one oval.*

- Automobile Engineering
- Civil Engineering
- ME Structural (Civil Eng.)
- ME Transportation (Civil Eng.)
- ME Environmental (Civil Eng.)
- Computer Engineering
- ME Computer (Computer Eng.)
- ME Data-Science (Computer Eng.)
- ME Cloud Computing (Computer Eng.)
- Information Technology
- Information and Communication Technology
- Cyber security
- Electrical Engineering
- ME Electrical (Electrical Eng.)
- Mechanical Engineering
- ME Thermal (Mechanical Eng.)

8. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

9. Curriculum have Local, National and Global impact *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

10. Opportunity for developing skills in the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

11. Curriculum outcome is well define. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

12. curriculum have choice based elective subject option. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

13. Easy availability of study materials and e-content related curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

14. Relevance of the Curriculum for providing employability. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

15. curriculum have Professional ethics and Human values. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

16. Remarks (if any)

This content is neither created nor endorsed by Google.

Google Forms

# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Student Name *

2. Enrollment No. *

3. Mobile No. *

4. Email id *

5. Program Name *

*Mark only one oval.*

- BHMS

6. Academic Year *

*Mark only one oval.*

- 2023-24

7. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

8. Curriculum have Local, National and Global impact *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
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- Strongly Disagree

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- Strongly Disagree

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- Strongly Disagree

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- Strongly Disagree

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- Neutral
- Disagree
- Strongly Disagree

15. Remarks (if any)

This content is neither created nor endorsed by Google.

Google Forms

# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Student Name *

2. Enrollment No. *

3. Mobile No. *

4. Email id *

5. Program Name

*Mark only one oval.*

- ◯ Bachelor of Law
- ◯ Master of Law

6. Academic Year *

*Mark only one oval.*

- 2023-24

7. Department *

*Mark only one oval.*

- LL.B
- B.COM LL.B
- B.A.LL.B
- LL.M (CRIMINOLOGY GROUP)
- LL.M (BUSINESS LAW GROUP)
- LL.M (ADR SPECIALIZATION)
- LL.M (CAL SPECIALIZATION)
- LL.M (CSL SPECIALIZATION)
- LL.M (IPL SPECIALIZATION)

8. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

9. Curriculum have Local, National and Global impact *

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- Disagree
- Strongly Disagree

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- Strongly Disagree

15. curriculum have Professional ethics and Human values. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

16. Remarks (if any)

_____

This content is neither created nor endorsed by Google.

Google Forms

# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Student Name *

2. Enrollment No. *

3. Mobile No. *

4. Email id *

5. Program Name *

*Mark only one oval.*

- ◯ B.Sc. Nursing
- ◯ M.Sc. Nursing
- ◯ P.B. B.Sc. Nursing

6. Academic Year *

*Mark only one oval.*

- 2023-24

7. Course *

*Mark only one oval.*

- 1st Year B.Sc.
- 2nd Year B.Sc.
- 3rd Year B.Sc.
- 4th Year B.Sc.
- 1st Year M.Sc. [ MSN ]
- 1st Year M.Sc. [ OBG ]
- 1st Year M.Sc. [ Child Health Nursing ]
- 1st Year M.Sc. [ Community Health Nursing ]
- 1st Year M.Sc. [ Mental Health Nursing ]
- 2nd Year M.Sc. [ MSN ]
- 2nd Year M.Sc. [ OBG ]
- 2nd Year M.Sc. [ Child Health Nursing ]
- 2nd Year M.Sc. [ Community Health Nursing ]
- 2nd Year M.Sc. [ Mental Health Nursing ]
- 1st Year P.B. B.Sc. Nursing
- 2nd Year P.B. B.Sc. Nursing

8. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

9. Curriculum have Local, National and Global impact *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

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- Disagree
- Strongly Disagree

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- Strongly agree
- Agree
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- Strongly Disagree

16. Remarks (if any)

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Enrollment No. *

2. Email id *

3. programme *

*Mark only one oval.*

- bachelor of physiotherapy
- Masters of physiotherapy

4. Academic Year *

*Mark only one oval.*

- 2023-24

5. Year of the student *

*Mark only one oval.*

- BPT 1st year
- BPT 2nd year
- BPT 3rd year
- BPT 4th year
- MPT 1st year
- MPT 2nd year

6. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

7. Curriculum have Local, National and Global impact *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

8. Opportunity for developing skills in the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

9. Curriculum outcome is well define. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

10. curriculum have choice based elective subject option. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

11. Easy availability of study materials and e-content related curriculum. *

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- Strongly agree
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12. Relevance of the Curriculum for providing employability. *

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13. curriculum have Professional ethics and Human values. *

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- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

14. Remarks (if any)

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Jaksh

Enrollment No. *

FPB2201401027

Mobile No. *

9157956755

Email id *

jakshpadhiyar2@gmail.com

Program Name *

Bachelor of Pharmacy (B.Pharm)

Academic Year *

- (●) 2023-24

Curriculum is Relevance to Programme. *

- ( ) Strongly agree
- ( ) Agree
- (●) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- ( ) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- (●) Strongly Disagree

Opportunity for developing skills in the curriculum. *

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ◉ Disagree
- ○ Strongly Disagree

Curriculum outcome is well define. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

curriculum have choice based elective subject option. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Easy availability of study materials and e-content related curriculum. *

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ◉ Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

curriculum have Professional ethics and Human values. *

- ◉ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Tirth Dashrathbhai Thakkar

Enrollment No. *

FPB2201401043

Mobile No. *

9586970799

Email id *

tirththakkar601@gmail.com

Program Name *

Bachelor of Pharmacy (B.Pharm)

Academic Year *

- ○ 2023-24

Curriculum is Relevance to Programme. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum have Local, National and Global impact *

- ○ Strongly agree
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Opportunity for developing skills in the curriculum. *

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Curriculum outcome is well define. *

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- ○ Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Patil Himesh prakashbhai

Enrollment No. *

FPB2201401036

Mobile No. *

9724422209

Email id *

patilhimesh259@gmail.com

Program Name *

Bachelor of Pharmacy (B.Pharm)

Academic Year *

- ○ 2023-24

Curriculum is Relevance to Programme. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum have Local, National and Global impact *

- ○ Strongly agree
- ◉ Agree
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- ○ Strongly Disagree

Opportunity for developing skills in the curriculum. *

- ○ Strongly agree
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- ○ Disagree
- ○ Strongly Disagree

Curriculum outcome is well define. *

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curriculum have choice based elective subject option. *

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Easy availability of study materials and e-content related curriculum. *

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Relevance of the  Curriculum for providing employability. *

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- ○ Strongly Disagree

Remarks (if any)

.....

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Google Forms

# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Patel Savan Kumar Sanjaybhai

Enrollment No. *

FPB2201401035

Mobile No. *

9825099941

Email id *

sspatel060405@gmail.com

Program Name *

Bachelor of Pharmacy (B.Pharm)

Academic Year *

- ○ 2023-24

Curriculum is Relevance to Programme. *

- ◉ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum have Local, National and Global impact *

- ◉ Strongly agree
- ○ Agree
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Opportunity for developing skills in the curriculum. *

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Curriculum outcome is well define. *

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Remarks (if any)

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Student Name *

2. Enrollment No. *

3. Mobile No. *

4. Email id *

5. Program Name *

*Mark only one oval.*

- ◯ Bachelor of Pharmacy (B.Pharm)

6. Academic Year *

*Mark only one oval.*

- ◯ 2023-24

7. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

8. Curriculum have Local, National and Global impact *

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15. Remarks (if any)

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Zaid khan baloch

Enrollment No. *

23000300050

Mobile No. *

9664954988

Email id *

Zaidkhanbaloch9664954988@gmail.com

Program Name *

Bachelor of Science

Academic Year *

- (●) 2023-24

Department *

B.Sc. (Zoology)

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
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Opportunity for developing skills in the curriculum. *

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Curriculum outcome is well define. *

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Remarks (if any)

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Google Forms

# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Patel urvi ben rasik bhai

Enrollment No. *

2200371104

Mobile No. *

7698700718

Email id *

urvi53900@gmail.com

Program Name *

Master of Science

Academic Year *

- (●) 2023-24

Department *

M.Sc. (Organic Chemistry)

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

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Remarks (if any)

Good

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

GADHAVI MIHIRKUMAR DEVIDANJI

Enrollment No. *

FSM2200371046

Mobile No. *

9328469812

Email id *

mihirgadhavi1310@gmail.com

Program Name *

Master of Science

Academic Year *

- (●) 2023-24

Department *

M.Sc. (Organic Chemistry)

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

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- ( ) Disagree
- ( ) Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Sheliya Ayanhusain Sajjadali

Enrollment No. *

FSB2200300052

Mobile No. *

9157101266

Email id *

sheliyaayan565@gmail.com

Program Name *

Bachelor of Science

Academic Year *

- (●) 2023-24

Department *

B.Sc. (Chemistry)

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Opportunity for developing skills in the curriculum. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum outcome is well define. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

curriculum have choice based elective subject option. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Easy availability of study materials and e-content related curriculum. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Relevance of the Curriculum for providing employability. *

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ◉ Strongly Disagree

curriculum have Professional ethics and Human values. *

- ○ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ◉ Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Student Name *

Ujas Patel

Enrollment No. *

23000371054

Mobile No. *

9023592757

Email id *

ujasp844@gmail.com

Program Name *

Master of Science

Academic Year *

- (●) 2023-24

Department *

M.Sc. (Organic Chemistry)

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Opportunity for developing skills in the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum outcome is well define. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have choice based elective subject option. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Easy availability of study materials and e-content related curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

.....

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# STUDENTS' FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Student Name *

2. Enrollment No. *

3. Mobile No. *

4. Email id *

5. Program Name *

*Mark only one oval.*

- ◯ Bachelor of Science
- ◯ Master of Science

6. Academic Year *

*Mark only one oval.*

- [ ] 2023-24

7. Department *

*Mark only one oval.*

- [ ] B.Sc. (Mathematics)
- [ ] B.Sc. (Physics)
- [ ] B.Sc. (Chemistry)
- [ ] B.Sc. (Botany)
- [ ] B.Sc. (Microbiology)
- [ ] B.Sc. (Zoology)
- [ ] M.Sc. (Mathematics)
- [ ] M.Sc. (Physics)
- [ ] M.Sc. (Organic Chemistry)
- [ ] M.Sc. (Botany)
- [ ] M.Sc. (Microbiology)
- [ ] M.Sc. (Zoology)

8. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- [ ] Strongly agree
- [ ] Agree
- [ ] Neutral
- [ ] Disagree
- [ ] Strongly Disagree

9. Curriculum have Local, National and Global impact *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

10. Opportunity for developing skills in the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

11. Curriculum outcome is well define. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

12. curriculum have choice based elective subject option. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

13. Easy availability of study materials and e-content related curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

14. Relevance of the Curriculum for providing employability. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

15. curriculum have Professional ethics and Human values. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

16. Remarks (if any)

_____

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# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

Dr. Pareshkumar N. Patel

Email id *

dean.fac.pharmacy@gokuluniversity.ac.in

Mobile No. *

9925310231

Department *

Faculty of Pharmacy

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

Pharmaceutics and Microbiology

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Adequacy of the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that the syllabus is defined in a way to clarify your teaching goals *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

To what extent you feel that your syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics? *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Is the timely coverage of syllabus possible in the mentioned number of hours? *

- ◉ Yes
- ○ No

To what extent do you feel that Sufficient reference material and books are available for the topics mentioned in the syllabus? *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

The evaluation methods mentioned in the syllabus are sufficient for providing proper assessment? *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Opportunity for developing skills in the curriculum. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum is sufficient to make your mind analytical to handle situations successfully at workplace. *

- ( ) Strongly agree
- (•) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- (•) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

.....

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# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

Dr. Rucha Acharya

Email id *

rnacharya.gpc@gokuluniversity.ac.in

Mobile No. *

9428513269

Department *

Faculty of Physiotherapy

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

Exercise Therapy 2

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Adequacy of the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that the syllabus is defined in a way to clarify your teaching goals *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that your syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics? *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Is the timely coverage of syllabus possible in the mentioned number of hours? *

- (●) Yes
- ( ) No

To what extent do you feel that Sufficient reference material and books are available for the topics mentioned in the syllabus? *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

The evaluation methods mentioned in the syllabus are sufficient for providing proper assessment? *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Opportunity for developing skills in the curriculum. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum is sufficient to make your mind analytical to handle situations successfully at workplace. *

- ( ) Strongly agree
- (•) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- ( ) Strongly agree
- (•) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

.....

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# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

Smita Deepak Panchal

Email id *

drsmitapanchal@gmail.com

Mobile No. *

9309809455

Department *

Faculty of Ayurveda

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

Ayurveda

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Adequacy of the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that the syllabus is defined in a way to clarify your teaching goals *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that your syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics? *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Is the timely coverage of syllabus possible in the mentioned number of hours? *

- (●) Yes
- ( ) No

To what extent do you feel that Sufficient reference material and books are available for the topics mentioned in the syllabus? *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

The evaluation methods mentioned in the syllabus are sufficient for providing proper assessment? *

- ◉ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum have Local, National and Global impact *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Opportunity for developing skills in the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum is sufficient to make your mind analytical to handle situations successfully at workplace. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

.....

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# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

Stuti panchal

Email id *

scpanchal.gilc@gokuluniversity.ac.in

Mobile No. *

9724210628

Department *

Faculty of Law

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

Integrated law

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Adequacy of the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that the syllabus is defined in a way to clarify your teaching goals *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that your syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics? *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Is the timely coverage of syllabus possible in the mentioned number of hours? *

- (●) Yes
- ( ) No

To what extent do you feel that Sufficient reference material and books are available for the topics mentioned in the syllabus? *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

The evaluation methods mentioned in the syllabus are sufficient for providing proper assessment? *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Opportunity for developing skills in the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum is sufficient to make your mind analytical to handle situations successfully at workplace. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

.....

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# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

VADHER MANJEET MOHANBHAI

Email id *

vmanjeet143@gmail.com

Mobile No. *

9537795177

Department *

Faculty of Ayurveda

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

SANSKRIT AND AYURVED ITIHAS

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Adequacy of the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that the syllabus is defined in a way to clarify your teaching goals *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that your syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics? *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Is the timely coverage of syllabus possible in the mentioned number of hours? *

- (●) Yes
- ( ) No

To what extent do you feel that Sufficient reference material and books are available for the topics mentioned in the syllabus? *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

The evaluation methods mentioned in the syllabus are sufficient for providing proper assessment? *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Opportunity for developing skills in the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum is sufficient to make your mind analytical to handle situations successfully at workplace. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

It's good curriculum

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# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

DR KHUSHBU RATHOR

Email id *

khushbuabi@gmail.com

Mobile No. *

7976878949

Department *

Faculty of Homeopathy

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

Bhms

Curriculum is Relevance to Programme. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Adequacy of the curriculum. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

To what extent you feel that the syllabus is defined in a way to clarify your teaching goals *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

To what extent you feel that your syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics? *

- ◉ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Is the timely coverage of syllabus possible in the mentioned number of hours? *

- ◉ Yes
- ○ No

To what extent do you feel that Sufficient reference material and books are available for the topics mentioned in the syllabus? *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

The evaluation methods mentioned in the syllabus are sufficient for providing proper assessment? *

- ◉ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum have Local, National and Global impact *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Opportunity for developing skills in the curriculum. *

- ( ) Strongly agree
- ( ) Agree
- (●) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Curriculum is sufficient to make your mind analytical to handle situations successfully at workplace. *

- ( ) Strongly agree
- (•) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- ( ) Strongly agree
- ( ) Agree
- (•) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

.....

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# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

Rathod Nilesh R

Email id *

nrrathod.gnc@gokuluniversity.ac.in

Mobile No. *

9664702190

Department *

Faculty of Nursing

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

B.Sc. Nursing, P.B.B.Sc. Nursing

Curriculum is Relevance to Programme. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Adequacy of the curriculum. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

To what extent you feel that the syllabus is defined in a way to clarify your teaching goals *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

To what extent you feel that your syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics? *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Is the timely coverage of syllabus possible in the mentioned number of hours? *

- ◉ Yes
- ○ No

To what extent do you feel that Sufficient reference material and books are available for the topics mentioned in the syllabus? *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

The evaluation methods mentioned in the syllabus are sufficient for providing proper assessment? *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum have Local, National and Global impact *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Opportunity for developing skills in the curriculum. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum is sufficient to make your mind analytical to handle situations successfully at workplace. *

- ( ) Strongly agree
- (•) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- ( ) Strongly agree
- (•) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

No any

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# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

Hiralben gunvantbhai prajapati

Email id *

hgprajapati.maths.gsc@gokuluniversity.ac.in

Mobile No. *

9512433691

Department *

Faculty of Science

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

Mathematics

Curriculum is Relevance to Programme. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Adequacy of the curriculum. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

To what extent you feel that the syllabus is defined in a way to clarify your teaching goals *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

To what extent you feel that your syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics? *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Is the timely coverage of syllabus possible in the mentioned number of hours? *

- ◉ Yes
- ○ No

To what extent do you feel that Sufficient reference material and books are available for the topics mentioned in the syllabus? *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

The evaluation methods mentioned in the syllabus are sufficient for providing proper assessment? *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum have Local, National and Global impact *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Opportunity for developing skills in the curriculum. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum is sufficient to make your mind analytical to handle situations successfully at workplace. *

- ( ) Strongly agree
- (•) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- ( ) Strongly agree
- (•) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

.....

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# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

Bhargav Parixitray Majmundar

Email id *

bpmajmundar.cvl.hcet@gokuluniversity.ac.in

Mobile No. *

9898675271

Department *

Faculty of Engineering

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

Civil Engineering

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Adequacy of the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that the syllabus is defined in a way to clarify your teaching goals *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that your syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics? *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Is the timely coverage of syllabus possible in the mentioned number of hours? *

- (●) Yes
- ( ) No

To what extent do you feel that Sufficient reference material and books are available for the topics mentioned in the syllabus? *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
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Curriculum have Local, National and Global impact *

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Opportunity for developing skills in the curriculum. *

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Relevance of the  Curriculum for providing employability. *

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- ( ) Disagree
- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

No

This form was created inside of Gokul Global University.

Google Forms

# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

Dr. Priyanka Tejabhai Sonapal

Email id *

ptsonapal.bhms@gokuluniversity.ac.in

Mobile No. *

7802081443

Department *

Faculty of Homeopathy

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

Homeopathic Repertory & Case Taking

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Adequacy of the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
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- ( ) Disagree
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Curriculum have Local, National and Global impact *

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curriculum have Professional ethics and Human values. *

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- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

.....

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# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

Dr. Kishor Patel

Email id *

kkpatel.phy.gsc@gokuluniversity.ac.in

Mobile No. *

7984568521

Department *

Faculty of Science

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

B.Sc., M.Sc., and P.hD. Physics

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Adequacy of the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that the syllabus is defined in a way to clarify your teaching goals *

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- ( ) Disagree
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Curriculum have Local, National and Global impact *

- ○ Strongly agree
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- ○ Neutral
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Opportunity for developing skills in the curriculum. *

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curriculum have Professional ethics and Human values. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

Nil

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Google Forms

# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

HARDIK B PATEL

Email id *

hbpatel.me.hcet@gokuluniversity.ac.in

Mobile No. *

9909754720

Department *

Faculty of Engineering

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

MECHANICAL ENGINEERING

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Adequacy of the curriculum. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that the syllabus is defined in a way to clarify your teaching goals *

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- ( ) Neutral
- ( ) Disagree
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- ○ Neutral
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- ◉ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum have Local, National and Global impact *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
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Opportunity for developing skills in the curriculum. *

- ◉ Strongly agree
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- ○ Neutral
- ○ Disagree
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- ○ Strongly agree
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- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

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- (•) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

.....

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# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

Dr. Renukaben N. Rajput

Email id *

dean.fac.hum@gokuluniversity.ac.in

Mobile No. *

9879112448

Department *

Faculty of Arts

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

BA Gujarati, MA Gujarati

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Adequacy of the curriculum. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that the syllabus is defined in a way to clarify your teaching goals *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

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- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Is the timely coverage of syllabus possible in the mentioned number of hours? *

- ◉ Yes
- ○ No

To what extent do you feel that Sufficient reference material and books are available for the topics mentioned in the syllabus? *

- ○ Strongly agree
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- ○ Strongly Disagree

Curriculum have Local, National and Global impact *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
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Opportunity for developing skills in the curriculum. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
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Relevance of the  Curriculum for providing employability. *

- ○ Strongly agree
- ◉ Agree
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- ○ Neutral
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- ○ Strongly Disagree

curriculum have Professional ethics and Human values. *

- ◉ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Remarks (if any)

.....

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# FACULTY FEEDBACK FORM – ON CURRICULUM AND SYLLABUS

Name of the Faculty *

Khatri Gaurav Kalpeshkumar

Email id *

gauravkhatri.gcca@gokuluniversity.ac.in

Mobile No. *

9510150638

Department *

Faculty of Computer science

Feedback of the Academic Year *

- (●) 2023-24

Course you teach *

BCA, MCA

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Adequacy of the curriculum. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that the syllabus is defined in a way to clarify your teaching goals *

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Is the timely coverage of syllabus possible in the mentioned number of hours? *

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- ( ) No

To what extent do you feel that Sufficient reference material and books are available for the topics mentioned in the syllabus? *

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- ( ) Agree
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- ( ) Disagree
- ( ) Strongly Disagree

Curriculum have Local, National and Global impact *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Opportunity for developing skills in the curriculum. *

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Relevance of the  Curriculum for providing employability. *

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- ( ) Agree
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- ( ) Strongly Disagree

Remarks (if any)

.....

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Google Forms

# EMPLOYERS' FEEDBACK FORM - ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Name of the Employer *

2. Email id *

3. Mobile No.

4. Name of the Organization/Institution

5. Feedback For *

*Mark only one oval.*

- B.A.ENGLISH
- B.A GUJARATI
- B.A. HISTORY
- B.A. ECONOMICS
- B.A. PSYCHOLOY
- B.A. GEOGRAPHY
- B.A. PHILOSOPHY
- B.A.SANSKRIT
- B.A.HINDI
- B.A.POLITICAL SCIENCE
- M.A ENGLISH
- M.A GUJARATI
- M.A.HISTORY
- M.A.ECONOMICS

6. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

7. Adequacy of the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

8. To what extent you feel that your syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics? *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

9. Curriculum have Local, National and Global impact *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

10. Opportunity for developing skills in the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

11. Depth of the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

12. Relevance of the Curriculum for providing employability. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

13. Curriculum is sufficient to make your mind analytical to handle situations successfully at workplace. *

*Mark only one oval.*

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

14. curriculum have Professional ethics and Human values. *

*Mark only one oval.*

- ◯ Strongly agree
- ◯ Agree
- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

15. Remarks (if any)

_____

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Google Forms

# EMPLOYERS' FEEDBACK FORM - ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Name of the Employer *

2. Email id *

3. Mobile No.

4. Name of the Organization/Institution

5. Feedback For *

*Mark only one oval.*

- ◯ BAMS (Faculty of Ayurveda)

6. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

7. Adequacy of the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

8. To what extent you feel that your syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics? *

*Mark only one oval.*

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- Agree
- Neutral
- Disagree
- Strongly Disagree

9. Curriculum have Local, National and Global impact *

*Mark only one oval.*

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- Agree
- Neutral
- Disagree
- Strongly Disagree

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- Agree
- Neutral
- Disagree
- Strongly Disagree

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- Disagree
- Strongly Disagree

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- Disagree
- Strongly Disagree

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- Strongly Disagree

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- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

15. Remarks (if any)

This content is neither created nor endorsed by Google.

Google Forms

# EMPLOYERS' FEEDBACK FORM - ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Name of the Employer *

2. Email id *

3. Mobile No.

4. Name of the Organization/Institution

5. Feedback For *

*Mark only one oval.*

- BCOM
- BBA
- MCOM
- MBA

6. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

7. Adequacy of the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
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- Neutral
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- Strongly Disagree

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*Mark only one oval.*

- Strongly agree
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- Strongly Disagree

10. Opportunity for developing skills in the curriculum. *

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- Agree
- Neutral
- Disagree
- Strongly Disagree

11. Depth of the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
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12. Relevance of the Curriculum for providing employability. *

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- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

13. Curriculum is sufficient to make your mind analytical to handle situations successfully at workplace. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

14. curriculum have Professional ethics and Human values. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

15. Remarks (if any)

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# EMPLOYERS' FEEDBACK FORM - ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Name of the Employer *

2. Email id *

3. Mobile No.

4. Name of the Organization/Institution

5. Feedback For *

*Mark only one oval.*

- ◯ Bachelor of Computer Applications(BCA)
- ◯ Master of Computer Application(MCA)

6. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

7. Adequacy of the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

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- Agree
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14. curriculum have Professional ethics and Human values. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

15. Remarks (if any)

This content is neither created nor endorsed by Google.

Google Forms

# EMPLOYERS' FEEDBACK FORM - ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Name of the Employer *

2. Email id *

3. Mobile No.

4. Name of the Organization/Institution

5. Feedback For

*Mark only one oval.*

- LL.B
- B.COM LL.B
- B.A.LL.B
- LL.M (CRIMINOLOGY GROUP)
- LL.M (BUSINESS LAW GROUP)
- LL.M (ADR SPECIALIZATION)
- LL.M (CAL SPECIALIZATION)
- LL.M (CSL SPECIALIZATION)

6. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

7. Adequacy of the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

8. To what extent you feel that your syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics? *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

9. Curriculum have Local, National and Global impact *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

10. Opportunity for developing skills in the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

11. Depth of the curriculum. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

12. Relevance of the Curriculum for providing employability. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

13. Curriculum is sufficient to make your mind analytical to handle situations successfully at workplace. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

14. curriculum have Professional ethics and Human values. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

15. Remarks (if any)

This content is neither created nor endorsed by Google.

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# EMPLOYERS' FEEDBACK FORM - ON CURRICULUM AND SYLLABUS

Name of the Employer *

Sonika pujari

Email id *

sonikapujari20@gmail.com

Mobile No.

7568348824

Name of the Organization/Institution

Feedback For *

M.Sc. Nursing

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Adequacy of the curriculum. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

To what extent you feel that your syllabus is sufficient to bridge the gap between industry standards /current global scenarios and academics? *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum have Local, National and Global impact *

- ◉ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Opportunity for developing skills in the curriculum. *

- ○ Strongly agree
- ◉ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Depth of the curriculum. *

- ◉ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Relevance of the  Curriculum for providing employability. *

- ◉ Strongly agree
- ○ Agree
- ○ Neutral
- ○ Disagree
- ○ Strongly Disagree

Curriculum is sufficient to make your mind analytical to handle situations successfully at workplace. *

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- ( ) Disagree
- ( ) Strongly Disagree

curriculum have Professional ethics and Human values. *

- ( ) Strongly agree
- (●) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

.....

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Google Forms

# EMPLOYERS' FEEDBACK FORM - ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Name of the Employer *

2. Email id *

3. Mobile No.

4. Name of the Organization/Institution

5. Feedback For *

*Mark only one oval.*

- ◯ Bachelor of Physiotherapy
- ◯ Master of Physiotherapy

6. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

7. Adequacy of the curriculum. *

*Mark only one oval.*

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- Strongly Disagree

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- Neutral
- Disagree
- Strongly Disagree

15. Remarks (if any)

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# EMPLOYERS' FEEDBACK FORM - ON CURRICULUM AND SYLLABUS

Name of the Employer *

Dr Rizvan Memon

Email id *

Memonrizwan099@gmail.com

Mobile No.

7359643873

Name of the Organization/Institution

Sukoon Hospital

Feedback For *

Bachelor of Physiotherapy

Curriculum is Relevance to Programme. *

- (●) Strongly agree
- ( ) Agree
- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Adequacy of the curriculum. *

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- (●) Strongly agree
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- ( ) Neutral
- ( ) Disagree
- ( ) Strongly Disagree

Remarks (if any)

.....

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# EMPLOYERS' FEEDBACK FORM - ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Name of the Employer *

2. Email id *

3. Mobile No. *

4. Name of the Organization/Institution *

5. Feedback For *

*Mark only one oval.*

- B.Sc. (Mathematics)
- B.Sc. (Physics)
- B.Sc. (Chemistry)
- B.Sc. (Botany)
- B.Sc. (Microbiology)
- B.Sc. (Zoology)
- M.Sc. (Mathematics)
- M.Sc. (Physics)
- M.Sc. (Organic Chemistry)
- M.Sc. (Botany)
- M.Sc. (Microbiology)
- M.Sc. (Zoology)

6. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

7. Adequacy of the curriculum. *

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- ◯ Neutral
- ◯ Disagree
- ◯ Strongly Disagree

15. Remarks (if any)

_____

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# EMPLOYERS' FEEDBACK FORM - ON CURRICULUM AND SYLLABUS

* Indicates required question

1. Name of the Employer *

2. Email id *

3. Mobile No.

4. Name of the Organization/Institution

5. Designation

*Mark only one oval.*

- ◯ Trustee
- ◯ Member : Board of Management
- ◯ Member : Board of Studies
- ◯ President
- ◯ Chief Executive officer
- ◯ Dean

6. Curriculum is Relevance to Programme. *

*Mark only one oval.*

- Strongly agree
- Agree
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- Strongly Disagree

7. Adequacy of the curriculum. *

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# Gokul Global University

## IQAC - FEEDBACK COMMITTEE

Notice:/IQAC/feedback/010 Date: 7/6/2023

**NOTICE**

A meeting of all the members of feedback committee is scheduled as given. All are requested to attend the same without fail.

Meeting Date: 17/06/2023

Time:10:30AM

Venue: Board Room,Gokul Global University,Siddhpur

**Agenda**

1. Responsibilities of feedback committee
2. Frequency of feedback
3. Discuss about the preparation of analysis report and action plan

Members of IQAC Feedback Committee

D.S. Vyas

IQAC

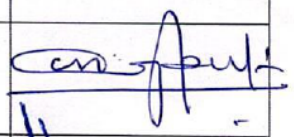
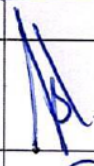
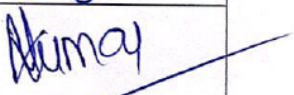
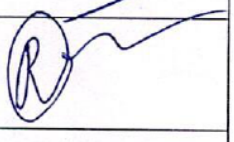
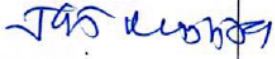
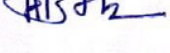
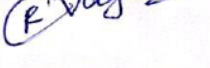
Deputy Director

# Gokul Global University

Date: 17/6/2023

## Minutes of Meeting

The meeting of the Feedback committee was held on 17/6/2023 at 10:30 AM to discuss the feedback responses filled by the students. The Coordinator feedback committee informed Faculty wise number of students who had filled the feedback form. The analyses of feedback report were presented. The Registrar congratulated the faculty members for getting good feedback responses. he also advised those Professor for self evaluation which point got average or poor feedback response. The Coordinator informed the house that scanned detailed feedback performs and Google form link with Principal Signature was emailed to College mail, NAAC Committee. He also informed that the Steno would forward feedback performs and Google form link to each faculty member. Meeting ended at 1.p.m. with vote of thanks.

| No. | Name | Department | Signature |
|---|---|---|---|
| 1 | Himatsinh Rajput | Registrar |  |
| 2 | Dr. Sunil Joshi | Ayurveda |  |
| 3 | Dr. Bhargav Majumdar | Engineering | |
| 4 | Dr. Arunkumar | Nursing |  |
| 5 | Dr. Renukaba Solanki | Arts |  |
| 6 | Dr. Ravindrasinh Rajput | Paramedical | |
| 7 | Dr. Jay Prakash Mishra | Commerce |  |
| 8 | Dr. Harshad Thakor | Law |  |
| 9 | Dr. Chetansinh Vaghela | Science |  |
| 10 | Mr. Manoj Patel | Comp Sci & App | |

Feedback analysis and recommendations to act upon feedback (2022-2023)

| Feedback from Student | Recommendation to competent Authority |
|---|---|
| It will be very helpful if, Professor suggests a specific book for each subject to self study and homework. Or should provide books/study material in hard copy incorporating the full syllabus. | It is recommended to add more E content on university websites and university institutes and central libraries. Further recommended faculty to create a useful and easy understandable study material so students can study themselves at home. |
| Tutorial and expert lecture should be more | It is recommended to add more tutorials and expert lectures so students can understand the course very briefly. |
| ICT should be used in the teaching learning process. | It is recommended that ICT should be used in the teaching learning process . More and more class rooms , seminar halls are required to be ICT enabled. |
| Practical/ Experiment Improvement | It is recommended to make provision to do more practical relevant courses. |
| Improve placement in civil engineering | It is recommended to promote placement activities on campus. |
| Some subjects are not taught by faculty. | It is recommended to increase student-faculty ratio so as no subject should be left without tutoring. |
| Subject are not choiceable | It is recommended to increase and give choice based options to students to study. |
| Interview preparation needed. | It is recommended to include a course focused on resume writing and interview preparation. |

| Feedback from Faculty member | Recommendation to competent Authority |
|---|---|
| For a few subjects the time framework of the syllabus during the semester is not enough. | It is recommended to review and do needful for time demanding subjects. |
| course should match with student future requirements. | While designing curriculum it is noted that the course should match with student future requirements. |
| The curriculum should be a balanced curriculum. | While designing curriculum, the weightage of a particular domain should be maintained appropriately. |
| Make provision for attending seminars and workshops or knowledge acquisition activities. | It is recommended to make provision for attending seminars and workshops or knowledge acquisition activities. |

| Feedback from Employer | Recommendation to competent Authority |
|---|---|
| It is required to make students industry ready. | It is recommended to include internship courses that students can opt and do in-house activities in industries. |
| More and more faculty should engage in further study to justify their academic positions. | It is recommended to make policies for staff to study on campus and outside campus. |
| Students should take maximum benefit of libraries and e-resources. | It is recommended to add at least an hour to sit in the library per day in the time table. |
| Practical legal cases study should be done. | Pick a real time cases and make practical solution in moock court. |
| Industrial and academic collaboration should be done. | It is recommended to make more MOUs with industries and universities. |

| Feedback from Alumina students | Recommendation to competent Authority |
|---|---|
| Requesting more placement activities. | It is recommended to organise a job fair or parallel placement activities twice a year. |
| Alumni meet from time to time. | It is recommended to organise an alumni meet once a year. |
| Add industry useful courses in the syllabus. | It is recommended to include courses that may be useful for industry. |
| There is a lack of communication between pass-out students. | It is recommended to make a registered group of alumina students so they can cooperate with each other in various modes. |
| Not sufficient professor in law stream for guidance | It is recommended to recruit enough teaching staff. |
| It is suggested to make an alumni students social media group. | It is recommended to create a social media account where alumni can join with each other. |
| Improvement is required in ICT based study. | It is recommended to add ICT enabled system in teaching process. |

GOKUL GLOBAL UNIVERSITY * SIDHPUR-384151 *

# Certificate of Registration

This is to certify that

## GOKUL GLOBAL UNIVERSITY, SIDHPUR

**(MANAGED BY GOKUL FOUNDATION)**

**STATE HIGHWAY 41, OPP IOCL DEPOT SIDHPUR, DISTRICT - PATAN, NORTH GUJARAT-384151, INDIA**

has been independently assessed by QRO
and is compliant with the requirement of:

## ISO 9001:2015

## Quality Management System

For the following scope of activities:

**STUDENT ADMISSION AND COUNSELING PROCESS, HUMAN RESOURCES PRACTICES (STAFFING AND RECRUITMENT), PRODUCTIVE LEARNING AND RESEARCH, SKILL DEVELOPMENT AND INNOVATION, EVALUATION AND EXAMINATION PROCESS, PURCHASE AND PROCUREMENT PROCESS (INVENTORY SYSTEM), FINANCIAL MANAGEMENT PROCESS, HEALTH, SAFETY, SECURITY AND ENVIRONMENTAL PROTECTION PROCESS, TRAVELLING, BOARDING AND LODGING PROCESS, PROJECT, TRAINING, PLACEMENT AND DEVELOPMENT PROCESS, SOCIETAL EXTENSION OUTREACH SERVICES, ESTATE MANAGEMENT AND MAINTENANCE PROCESS, IMS IMPLEMENTATION PROCEDURE, MIS ESTABLISHMENT AND EXECUTION, CO-CURRICULAR ENRICHMENT PROCESS, STUDENT AND STAFF GRIEVANCE REDRESSAL PROCESS, HOSPITALITY AND BRANDING PROCESS, LIBRARY, PUBLICATION AND REPROGRAPHY SYSTEM, DOCUMENTATION AND REGULATORY PROCESS, INSTITUTIONAL AUDIT PROCESS, QUALITY ASSURANCE & QUALITY MANAGEMENT PROCESS**

Date of Certification: 25th November 2023
1st Surveillance Audit Due: 24th November 2024
2nd Surveillance Audit Due: 24th November 2025
Certificate Expiry: 24th November 2026

**Certificate Number: 305023112525Q**

CAB # 119005

Head of Certification

Validity of this certificate is subject to annual surveillance audits to be done successfully on or before 365 days from date of the audit.
(In case surveillance audit is not allowed to be conducted; this certificate shall be suspended / withdrawn).
**The Validity of this certificate can be verified at www.qrocert.org**
This certificate of registration remains the property of QRO Certification LLP, and shall be returned immediately upon request.

**India Office : QRO Certification LLP**
142, IInd Floor, Avtar Enclave, Near Paschim Vihar West Metro Station, Delhi-110063, (INDIA)
Website : www.qrocert.org, E-mail : info@qrocert.org

# Report on the Internationalization of Higher Education at Gokul Global University

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2.2 Student and Faculty Exchange Programs

2.3 Cultural Exchange Events

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3.2 Goals and Objectives

3.3 Implementation Strategies

4. **International Relations**

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5. **Collaborations with Trade Organizations**

5.1 Participation in Educational Fairs

5.2 Benefits of Collaborations

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6.1 Overview of MoUs

6.2 Outcomes of Partnerships

7. **Conclusion**

8. **References**

## 1. Introduction

Gokul Foundation Trust was established on August 17, 2009, with a noble mission to serve society by focusing on the career development of aspiring individuals. The trust, led by Shri Balwantsinh C. Rajput, aims to align educational offerings with global standards for higher education and industry demands of the next century. At the heart of this mission is the belief that education plays a crucial role in helping individuals realize their dreams.

The trust encompasses a wide range of disciplines, including Engineering and Technology, Nursing, Paramedical Studies, Commerce and Management, Science, Law, Arts, Humanities, Social Sciences, Computer Science and Applications, Skill and Vocational Development, and AYUSH (Ayurveda) Studies. Gokul Foundation Trust is dedicated to creating and nurturing knowledge through its educational institutions.

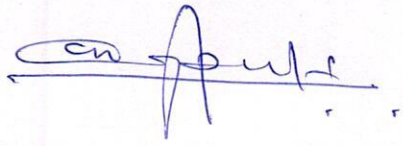
As a charitable trust, it is committed to imparting, facilitating, and managing educational programs that elevate living standards. It oversees various faculties offering research, postgraduate, undergraduate, and diploma courses, along with certification programs approved by professional councils and recognized by the UGC and MHRD, Government of India.

**Internationalization in higher education** is a vital process that seeks to enhance the global reach and reputation of educational institutions. This approach not only enriches the educational experience but also prepares students to thrive in an increasingly interconnected world. By fostering cross-border collaborations, sharing knowledge, and promoting cultural exchange, internationalization plays a crucial role in advancing academic excellence and innovation.

Gokul Global University has established a fully dedicated **International Students Affairs Cell (ISAC)**, headed by Mr Kundan Dhangar, Director, Mr. Vikram Singh Jindolia, Manager, Mr Shamim, Office Executive. with their excellency and experience in international affairs within higher education, All Staff working in ISAC are highly knowledgeable about the challenges that international students face while transitioning to India for their studies. GGU leadership ensures that the ISAC effectively addresses these challenges, providing essential support to help students adapt and thrive in their new academic environment.

Gokul Global University (GGU) recognizes the significance of this trend and has actively undertaken a variety of initiatives to expand its international footprint. Understanding that a global perspective is essential for modern education, GGU is committed to integrating international dimensions into its academic programs and institutional practices.

This report provides a comprehensive examination of GGU's efforts in the realm of internationalization. It explores the university's diverse activities aimed at fostering global engagement, outlines its strategic plans for promoting international collaborations and educational initiatives, and highlights its international relations, including connections with foreign embassies and organizations.



Additionally, the report details GGU's collaborations with trade organizations that facilitate educational fairs and other events abroad, showcasing the university's active role in the global education landscape. Finally, it provides insights into the memoranda of understanding (MoUs) signed with foreign universities, detailing the objectives of these partnerships and the outcomes achieved thus far.

Through these multifaceted efforts, GGU aims to enhance its global standing, attract international talent, and create a vibrant academic community that embraces diversity and fosters innovation.

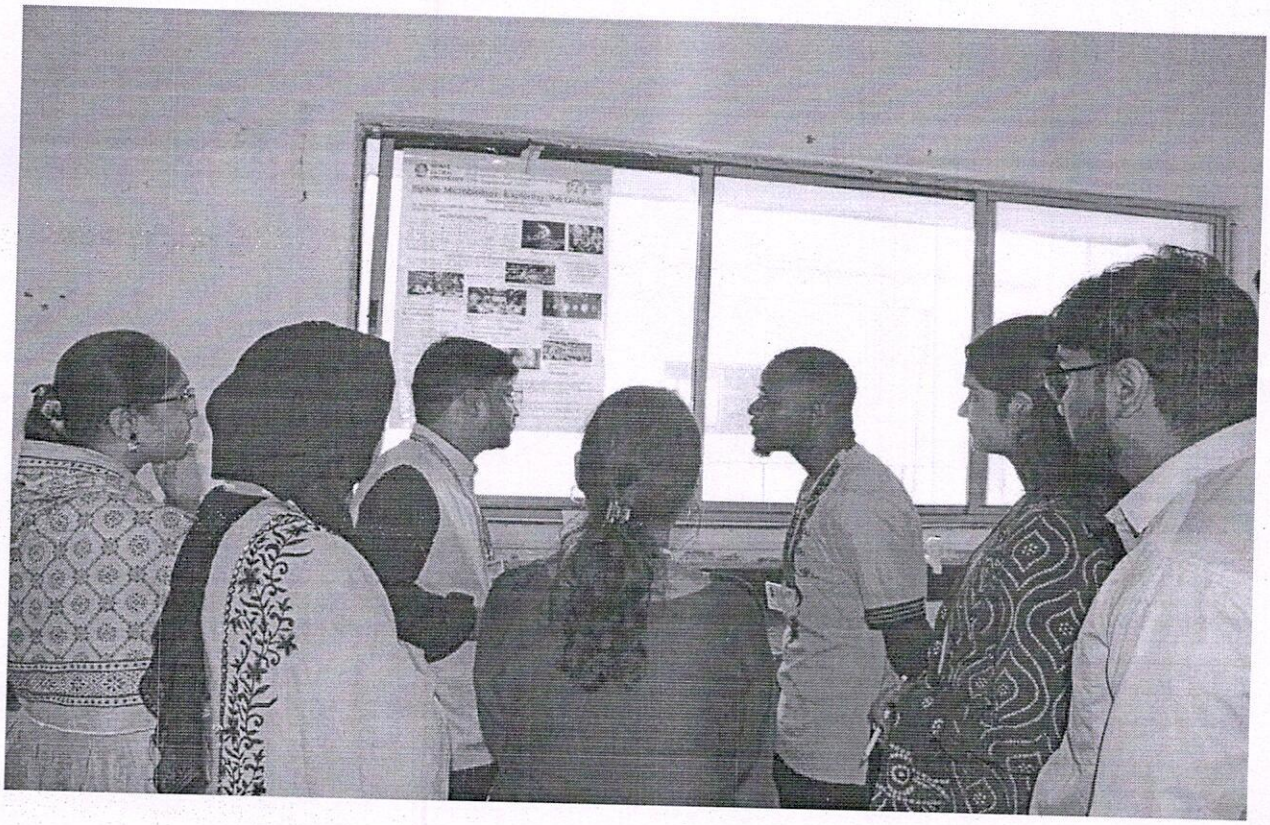
## 2. Activities/Events Related to Internationalization in GGU

### 2.1 International Conferences and Workshops

GGU organizes a variety of international conferences and workshops to foster academic collaboration and exchange ideas on global issues. Notable events include:

**Annual Global Education Summit:** This summit brings together educators, policymakers, and industry leaders to discuss trends and innovations in global education. The event has featured keynote speakers from prestigious international institutions and has facilitated networking opportunities among participants.

**International Research Symposium:** Aimed at promoting interdisciplinary research, this symposium invites scholars from various fields to present their work. The focus is on collaborative projects that address global challenges such as climate change, health crises, and technological advancements.



*Research activities of our international scholars*

### 2.2 Student and Faculty Exchange Programs

GGU has established comprehensive student and faculty exchange programs that enhance the academic experience and cultural understanding. Key features include:

**Semester Abroad Programs:** These programs allow students to study at partner universities across the globe for one semester. Participants gain valuable exposure to different educational systems and cultural environments.

**Faculty Exchange Initiatives:** GGU encourages faculty members to engage in teaching and research opportunities at international institutions. This initiative not only enriches the faculty's professional development but also strengthens academic ties between GGU and partner universities.

### 2.3 Cultural Exchange Events

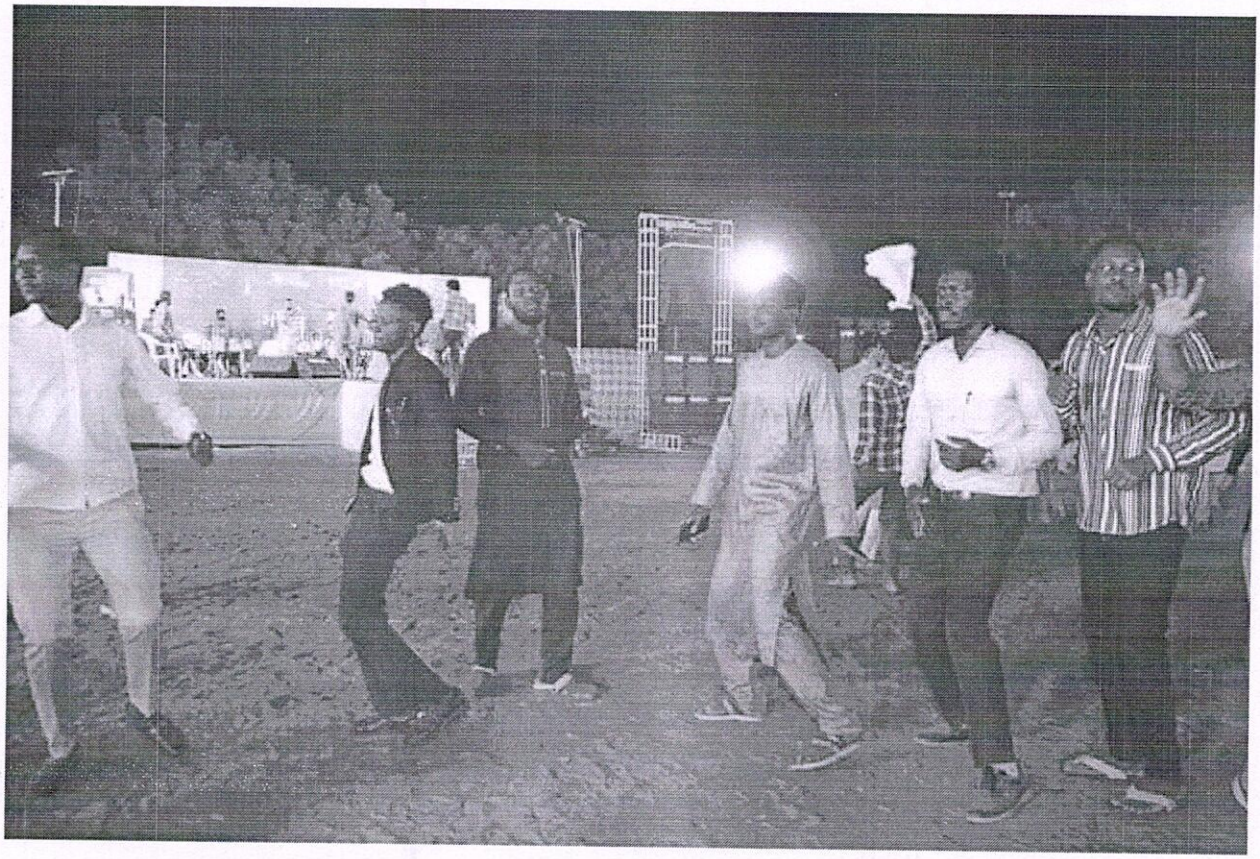
At GGU, we enthusiastically celebrate cultural programs representing each country of the students studying at our university. These events provide a vibrant opportunity for students to showcase their heritage and foster a deeper understanding of diverse cultures within our academic community.

Cultural exchange events play a vital role in promoting diversity and inclusivity at GGU. Key events include:

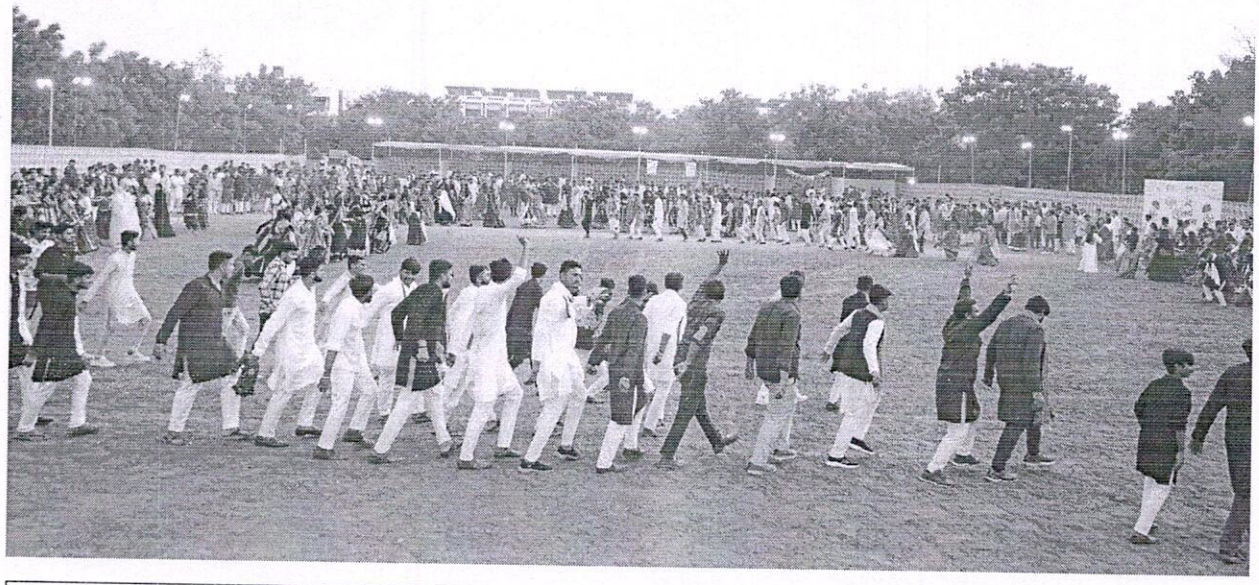
**International Day Celebrations:** These celebrations feature food, music, and performances from various cultures, fostering a sense of global community among students and faculty.

**Language and Culture Workshops:** Workshops are held to teach students about different languages and cultural practices, enhancing their global competence and cultural awareness.

*Our international students alongside the Hon'ble Chairman and Chancellor, Shri Balwantsingh Rajput, who is also the Cabinet Minister of the Government of Gujarat, at the world-renowned traditional festival of Gujarat, Garba, during "Rashoutshav-2024."*



*Active participation of our international students in various cultural activities in our Gokul Global University.*



*Active participation of our international students in various cultural activities in our Gokul Global University.*

## 3. Strategic Plan Activity for Promoting International Collaborations

### 3.1 Vision and Mission

GGU's strategic plan for internationalization aligns with its vision of becoming a globally recognized institution. The mission emphasizes:

**Quality Education:** Providing high-quality education that incorporates global perspectives.

**Research Excellence:** Engaging in research that addresses local and global challenges.

### 3.2 Goals and Objectives

The strategic plan outlines several goals to enhance international collaboration:

**Expanding Global Partnerships:** Establishing connections with universities and institutions in key regions, including Nigeria, Liberia, South Sudan, Sudan, Afghanistan, Benin, Cameroon, Eswatini, Rwanda, Sierra Leone, Zambia, Zimbabwe, Canada etc.

**Enhancing Research Collaborations:** Promoting joint research initiatives that leverage the strengths of partner institutions.

**Increasing Student Mobility:** Aiming for a significant increase in inbound and outbound student exchanges.

### 3.3 Implementation Strategies

To achieve these goals, GGU has developed the following strategies:

**Establishment of an International Relations Office:** This office is responsible for managing partnerships, facilitating international programs, and providing support to students and faculty headed by Dr. Vikarm Singh.

**Regular Assessment of Global Trends**: The university keeps abreast of international education trends to identify potential partnership opportunities and adapt its programs accordingly.

**Funding Opportunities for International Programs**: GGU allocates resources for scholarships and grants to support students and faculty participating in international activities.

GOKUL
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UNIVERSITY

*Ms. Esther Karema Mutua, the Education Attache at the Kenya High Commission in the Ministry of Education, visited Gokul Global University to discuss potential educational collaborations with Kenya.*

**. International Relations**

**4.1 Connections with Foreign Embassies**

GGU has cultivated strong relationships with various foreign embassies in India. These connections facilitate:

Scholarship Opportunities: Information on scholarships available for international students and GGU's own scholarships for outbound students.

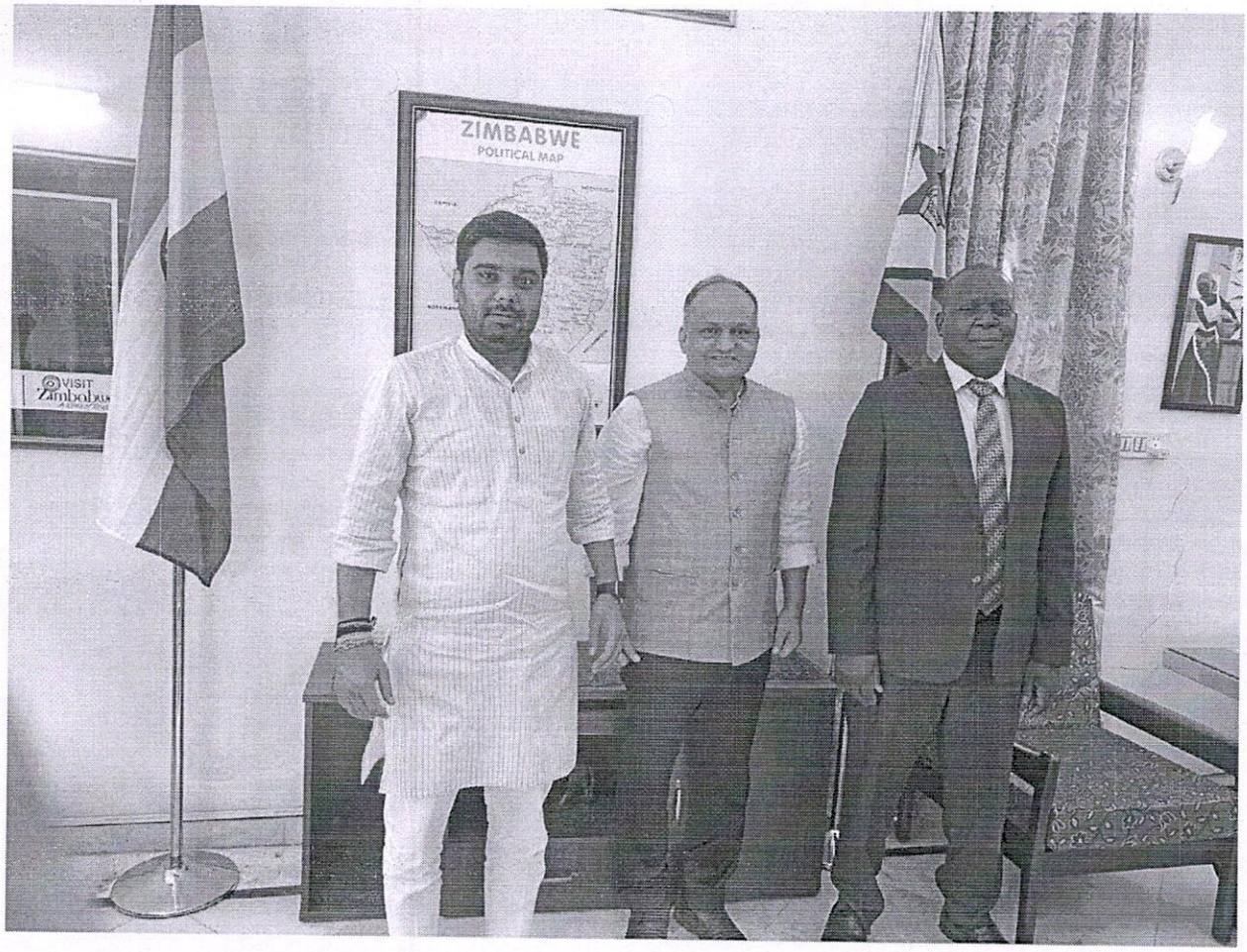
**Networking Opportunities:** Access to events and programs organized by embassies that promote educational initiatives and cultural exchanges.

**4.2 Engagement with International Organizations**

The university actively engages with international organizations to enhance its global visibility and foster academic collaborations. This includes participation in:

Global Education Networks: GGU is a member of various international educational networks that facilitate knowledge sharing and collaborative projects.

Partnerships with Non-Governmental Organizations (NGOs): Collaborating with NGOs focused on education and development, GGU contributes to initiatives aimed at improving educational access and quality worldwide.




*Our CEO Mr. Rajendrasingh Solanki recently visited the Embassy of the **Republic of Zimbabwe** in New Delhi and had a productive meeting with **Mr. Peter Hobwani**, Deputy Head of Mission, to discuss opportunities for collaboration and strengthening educational ties between Gokul Global University and Zimbabwe.*

*Delighted to meet Ms. Esther Karema Mutua, Education Attache at the Kenya High Commission in New Delhi. We had a productive discussion on fostering educational collaborations, and I presented her with our university brochure. She assured me she would visit our Gokul Global University.*

*Delighted to meet Mr. Mamadou Barry, Second Secretary in Socio-Cultural Affairs, Embassy of the* ***Republic of Guinea*** *in New Delhi. We had a productive discussion on fostering educational collaborations, and I presented with him our university brochure.*

*Our Deputy Director, Dr. Sumer Singh Rathore, visited the Prime Minister's Office in Nepal for a productive meeting with Renu Dahal, the current Mayor of Bharatpur Metropolitan City and daughter of the sitting Prime Minister, Pushpa Kamal Dahal, who is also the chairman of CPN (MC). The focus of their discussion was on fostering Indo-Nepal educational collaborations.*

## 5. Collaborations with Trade Organizations

### 5.1 Participation in Educational Fairs

GGU collaborates with trade organizations that organize educational fairs abroad, enabling the university to showcase its academic programs and attract international students. Key collaborations include:

Global Education Fairs: Participation in fairs in countries like the USA, UK, and Australia provides opportunities to engage with prospective students.

Workshops and Presentations: GGU conducts informative sessions about its programs, admission processes, and campus life for interested students.

### 5.2 Benefits of Collaborations

These collaborations have led to:

**Increased Enrollment:** A notable rise in the number of international students enrolling at GGU, enhancing the diversity of the student body.

**Enhanced Institutional Reputation**: Greater visibility and recognition in the global education sector, positioning GGU as a desirable destination for international students.

## 6. Details of MoUs Signed with International Universities

### 6.1 Overview of MoUs

GGU has established several MoUs with leading international universities to promote academic cooperation. Notable agreements include:

MoU with **Brookfield International University (USA)**: Focused on joint research projects, faculty exchanges, and collaborative curriculum development.

MoU with **Yobe University (Nigeria):** Emphasizes student exchange programs and the sharing of best practices in teaching and learning.

**MoU with Udmawa University (Canada):** Aimed at developing dual degree programs and fostering research collaborations in various fields.

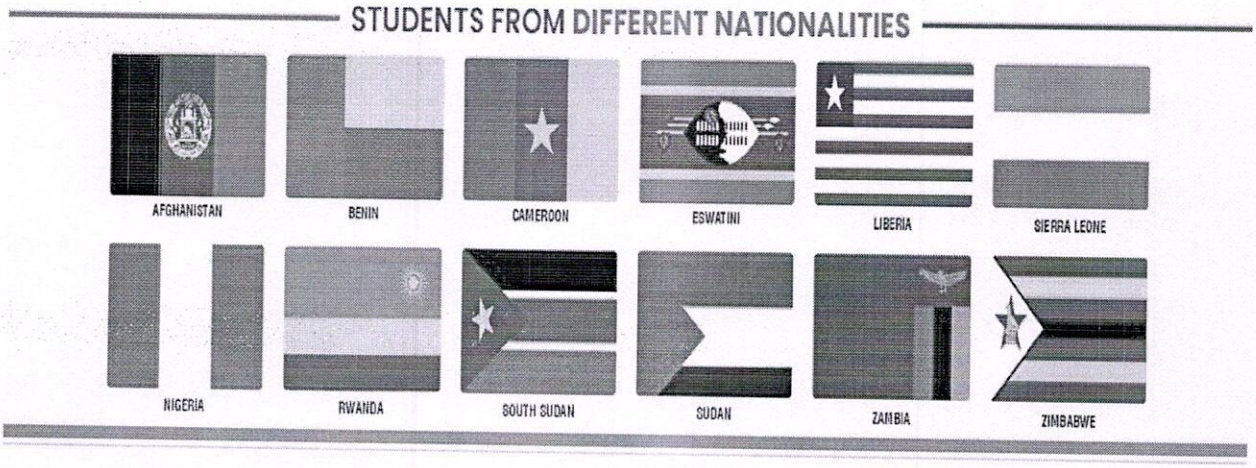
### 6.2 Outcomes of Partnerships

The partnerships have yielded significant outcomes:

**Joint Research Publications:** Increased collaboration resulting in joint research publications in reputable journals, enhancing GGU's academic profile.

**Dual Degree Programs:** Successful implementation of dual degree programs, allowing students to earn degrees from both GGU and partner institutions, thus broadening their career prospects.

**Enhanced Cultural Exchange:** Opportunities for students to experience diverse educational environments and cultural perspectives through exchange programs and collaborative projects.




## 7. Conclusion

Gokul Global University is deeply committed to the internationalization of higher education. Through active engagement in various activities, strategic planning, and the establishment of fruitful partnerships, GGU has positioned itself as a dynamic player in the global education landscape. The university's efforts to expand its international collaborations and enhance the academic experience for students and faculty will continue to enrich its reputation and contribute to its mission of providing quality education in a global context.

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23/10/2024