# Jaypee Institute of Information Technology

# Integrated M.Tech. Biotechnology

# Semester IX

# Course Descriptions

# Detailed Syllabus

## Lecture-wise Breakup

| | | | |
|---|---|---|---|
| **Course Code** | 15B1NBT833 | **Semester** Odd **(specify Odd/Even)** | **Semester** Summer **Session** 2018-2019 **Month from** June to July |
| **Course Name** | Plants Diseases & Biotechnology | | |
| **Credits** | 3 | **Contact Hours** | 3 |

| | | |
|---|---|---|
| **Faculty (Names)** | **Coordinator(s)** | 1. Prof. S Krishna Sundari |
| | **Teacher(s) (Alphabetically)** | 1. Prof. S Krishna Sundari |

| **COURSE OUTCOMES** | | **COGNITIVE LEVELS** |
|---|---|---|
| CO833.1 | Comprehend different types of plant diseases, classification of pathogens and host responses. | Understand Level(C2) |
| CO833.2 | Compare different disease control mechanisms and Risks involved | Apply Level(C3) |
| sssCO833.3 | Examine advances in the field of plant biotechnology to develop disease resistant plants | Analyze Level(C4) |
| CO833.4 | Apply modern tools for disease management and achieve sustainable agricultural productivity | Analyze Level(C3) |

| **Module No.** | **Title of the Module** | **Topics in the Module** | **No. of Lectures for the module** |
|---|---|---|---|
| **1.** | Introduction | Agriculture productivity & Global food prospects, Impact of disease on crop productivity, existing methods (chemical | 3 |

| | | | |
|---|---|---|---|
| | | pesticides, insecticides) of plant disease control | |
| **2.** | Plant Physiology & plant genome | Plant physiology, Genetic basis of Plant genes, growth and development, response to disease/infection in plants, plant signaling pathways | 8 |
| **3.** | Plant diseases | Plant pathology and disease cycle, principle groups of plant pathogens belonging to: Bacteria, fungus, virus, nematodes, insect pests, other factors, diseases with major impact on plant productivity | 10 |
| **4.** | Molecular plant pathology | Molecular basis of genetic modification and crop improvement, RNAi technology, Baculovirus mediated bio-control and other tools to generate disease resistance | 5 |
| **5.** | Plant disease control | Classical breeding to modern genetic engineering tools for plants, plant secondary metabolites and their role in systemic acquired resistance (SAR) | 5 |
| **6.** | GM plants | Enhancing resistance with plant genes, developing genetically modified plants with improved disease resistance | 5 |
| **7.** | Bio-control methods | Integrated pest management, Pathogen derived resistance, Antimicrobial proteins, Plant bodies, PGPR (plant growth promoting rhizobacteria) and their role in disease control | 6 |
| | | **Total number of Lectures** | **42** |

**Evaluation Criteria**

| **Components** | **Maximum Marks** |
|---|---|
| T1 | 20 |
| T2 | 20 |
| End Semester Examination | 35 |
| TA | 25 (…) |
| **Total** | **100** |

**Recommended Reading material:** Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)


| | |
|---|---|
| **1.** | Plants, genes and crop biotechnology. Maarten Chrispeels, David Sadava, 2nd edition, published by American society of plant biologists & ASPB foundation. |
| **2.** | Molecular Biotechnology: principles and Applications, Bernard Glick, Jack J Pasternack, Cheryl Patten, 4th edition, ASM press |

# Detailed Syllabus

## Lecture-wise Breakup

| | | | |
|---|---|---|---|
| **Course Code** | 15B1NBT834 | **Semester Summer** | **Semester Summer Session** 2018 - 2019<br>**Month from** May to July |
| **Course Name** | Aquaculture | | |
| **Credits** | **4** | **Contact Hours** | **9** |

| | | |
|---|---|---|
| **Faculty (Names)** | **Coordinator(s)** | Dr. Priyadarshini |
| | **Teacher(s) (Alphabetically)** | 1.Dr. Priyadarshini,<br>2.Dr. Ashwini Mathur |

| **COURSE OUTCOMES** | | **COGNITIVE LEVELS** |
|---|---|---|
| **CO1** | Explain scope & significance of aquaculture at global and Indian scenario | **Understand level (C2)** |
| **CO2** | Compare different cultivation techniques for aquatic organism | **Understand level (C2)** |
| **CO3** | Apply sustainable aquaculture practices related to environment, community, business and farm management | **Apply Level (C3)** |
| **CO4** | Identify hatchery and cultivation technology | **Analyze level (C4)** |

| **Module No.** | **Title of the Module** | **Topics in the Module** | **No. of Lectures for the module** |
|---|---|---|---|
| 1. | **Introduction** | History, definition, scope and significance of aquaculture, comparison of aquaculture with agriculture and commercial fisheries. Different aquaculture systems. Aquaculture - Global and Indian Scenario. | **2** |
| **2.** | **Pond ecology** | Ecology of culture ponds. Nutrient cycles, Laws of limiting factor. Fertilizations and manuring. Liming and application of fertilizers and manures. Significance and important groups of phytoplankton, zooplankton and benthos in culture ponds. Nutrient dynamics, algal blooms.Management of water and soil quality parameters. | **4** |

| | | | |
|---|---|---|---|
| | | Correction of pH, measures for increasing the concentration of oxygen and reducing the concentration of ammonia and hydrogen sulphide. | |
| **3**. | **Cultivable Freshwater fishes** | Criteria for the selection of species, Cultivable freshwater fishes- carps, airbreathing fishes,<br>tilapia, trout, freshwater prawn, frogs. | **4** |
| **4.** | **Brackishwater culture and mariculture** | Brackishwater resources and fishes of commercial importance – Milk fish, mullet, pearl spot, seabass, shrimps, crabs; selection of site. Major brackish water culture systems in India, prawn filtration, Basabhanda, kharlands – Different organisms in Mariculture – mussel, edible oyster, pearl oyster and sea weeds. Scope of open sea farming in India. Important fin fishes cultured in the open seas and the culture systems. Present status and recent developments in mariculture. | **4** |
| **5.** | **Culture of Prawns, Molluscs and Frog** | Cultivable species of freshwater prawns and their biology – culture of *Macrobrachiumrosenbergii*, Freshwater pearl culture – Present status of freshwater pearl culture and production in India. Prospects of culturing frog in India. | **4** |
| **6.** | **Aquaculture for stable environment** | Sewage fed fish culture, sewage treatment, Sewage cum fish culture in India. Fish in relation to public health, Larvivores fishes and mosquito eradication usingfishes. | **4** |
| **7.** | **Reservoir fisheries** | Major reservoirs in India, measures for increasing production from reservoirs in India and abroad, Game fishery. | **2** |
| **8.** | **Integrated Farming** | Recent development in integrated farming, Rice cum fish culture, Duck cum fish culture, Poultry cum fish culture and Pig cum fish culture. Organic aqua farming. Fish culture in cages and pens. Running water fish culture. | **6** |
| **9.** | **Systems in freshwater Aquaculture** | Fish culture in cages and pens, race way, indoor tanks, canals, silo culture, Aquaponics. Monoculture, polyculture, composite fish culture. | **4** |
| **10.** | **Hatchery technology, design and managment** | Criteria for site selection of hatchery and nursery, design and function of incubators, hatchery system-design and operation, hatchery protocols, rearing technology. | **4** |

| | | | |
|---|---|---|---|
| **11.** | **Culture of aquatic plants** | Cultivation of different aquatic plants. | **2** |
| **12.** | **Economics** | Marketing and economics of fish seed and fish. | **2** |
| | | **Total number of Lectures** | **42** |

**Evaluation Criteria**

| **Components** | **Maximum Marks** |
|---|---|
| T1 | 20 |
| T2 | 20 |
| End Semester Examination | 35 |
| TA | 25 (Asignment1, Assignment2) |
| **Total** | **100** |

**Recommended Reading material:** Author(s), Title, Edition, Publisher, Year of Publication etc. ( Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)


| | |
|---|---|
| **1.** | T.V.R. Pillay, Aquaculture: Priciples& Practices, Fishing News Books, New Book, Cambridge University Press, Cambridge, UK |
| **2.** | New M B, Freshwater prawn farming, 2000, CRC Publication. |
| **3.** | R. L. Welcomme: Inland Fisheries: Ecology & Management, 2001, Fishing News Books. |
| **4.** | S De Silva (ed): Reservoir and culture based Fisheries: Biology & Management, 2001, ACAIR Proceedings. |
| **5.** | M. C. M. Beveridge and B. J. McAndrew: Tilapias: Biology & exploitations, 2000, Kluwer Academic Publishers, London. |

# Detailed Syllabus

## Lab-wise Breakup

| | | | |
|---|---|---|---|
| **Course Code** | **17M15BT112** | **Semester** Even **(specify Odd/Even)** | **Semester** II **Session** 2018 -2019 **Month from** January to June |
| **Course Name** | **Biotechniques Lab-II** | | |
| **Credits** | 3 | **Contact Hours** | 6 |

| | | |
|---|---|---|
| **Faculty (Names)** | **Coordinator(s)** | Prof. Pammi Gauba |
| | **Teacher(s) (Alphabetically)** | Dr. Indira P. Sarethy, Prof. PammiGauba, Dr.ReemaGabrani, Dr. Shweta Dang, Dr.Vibha Rani |

| **COURSE OUTCOMES** | | **COGNITIVE LEVELS** |
|---|---|---|
| **CO1** | Experiment with high end analytical techniques in biotechnology | **Apply (Level C3)** |
| **CO2** | Develop basic and applied skills in cell culture | **Apply (Level C3)** |
| **CO3** | Examine and analyse disease-specific drug targets | **Analyze (Level C4)** |
| **CO4** | Analyse bioactive compounds from plant and microbial systems | **Analyze (Level C4)** |

| **Module No.** | **Title of the Module** | **List of Experiments** | **CO** |
|---|---|---|---|
| **1.** | Analytical techniques | To learn andperform High-performance liquid chromatography (HPLC); Prepration and characterization of plant extracts using HPLC; To learn and perform Gas chromatography | 3 |
| **2.** | Cell culture techniques | Preparation and sterilization of media for cell culture; subculture of animal cell lines; analysis and counting of adherent cells; cell cytotoxicity determination | 3 |
| **3.** | Drug target analyses | Analyze drug targets by biochemical and fluorescent assays | 3 |
| **4.** | Natural product | Extraction of antioxidant compound from *in vitro* grown | 3 |

| | | | |
|---|---|---|---|
| | analyses | plant and bacteria; purification of compound; antioxidant capacity analyses of extracts | |
| | | **Total** | **12** |

**Evaluation Criteria**

| **Components** | **Maximum Marks** |
|---|---|
| Mid-Term Viva | 20 |
| Day-to-Day (Lab record, attendance, performance) | 60 |
| Final Viva | 20 |
| **Total** | **100** |

**Recommended Reading material:** Author(s), Title, Edition, Publisher, Year of Publication etc. (Text books, Reference Books, Journals, Reports, Websites etc. in the IEEE format)


| | |
|---|---|
| **1.** | Biotechnology Procedures and Experiments Handbook http://site.iugaza.edu.ps/mwhindi/files/BIOTECHNOLOGY-PROCEDURES-AND-EXPERIMENTS-HANDBOOK.pdf |
| **2.** | J.M. Davis, "Basic Cell Culture – A Practical Approach", 2nd edition Oxford University Press, 2002 |
| **3.** | Lab manual on Biotechniques http://inpressco.com/lab-manual-on-biotechniques/ |
| **4.** | Methods standardized in lab |