



Shri Vaishnav Vidyapeeth Vishwavidyalaya, Indore

Shri Vaishnav Institute of Science

Department of Life Science

Generic Electives (GE) Under Graduate Courses

SEMESTER III

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTUGE01	GE	Stress and Human Health	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment shall be based following components: Quiz / Assignment / Project/ Participation in Class, given that no component shall exceed more than 10 marks.**

Course Objectives:

1. Understanding of the stress process and its relation to health and disease.
2. The incorporation of stress management techniques into one's lifestyle.

Course Outcomes:

1. Recognition of stress symptoms and its management.
2. Understanding Biochemical and Physiological changes during stress.

UNIT - I: Nature of stress


Stress – concept, features types of stress and identify types of stressors. Potential Sources of Stress, Symptoms of stress, long-term effects from stressors.


UNIT - II: Oxidative stress and antioxidant

Oxidative stress. Type of Free radicals and environmental factors in generation of free radicals, antioxidant and its mechanism.

UNIT - III: Impact of stress on hormonal system

Hormonal Changes during Stress and their effects on body: - cortisol, Catecholamines, Vasopressin, Thyroid Hormones, Gonadotropins, Prolactin, Growth Hormone, insulin.


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BTUGE01 Stress and Human Health

UNIT – IV: Impact of stress on diseases


Describe the physiological stress response and its relationship to health, disease, Acute and Chronic Stress Responses. Consequences of stress.


UNIT - V: Stress management

Stress management therapy: through mind control via music, Visualization, meditation, physical exercise, practice of yoga, and nutrition.

BOOKS:

1. Allen Elkin. (2013). Stress Management for Dummies (2nd Edition). John Wiley and sons.
2. Helmut Sies. (2019). Oxidative Stress and Inflammatory Mechanisms in Obesity, Diabetes, and the Metabolic Syndrome. by CRC Press. SBN 9780367388782
3. Özben, Tomris. (1997). Free Radicals, Oxidative Stress, and Antioxidants: Pathological and Physiological Significance. Springer Publisher.
4. Surh Y.J and Packer L. (2005). Oxidative Stress, Inflammation, and Health. Taylor and Francis group.


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SEMESTER IV

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			-		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	.	.				
BTUGE02	GE	Photobiology	60	20	20	-	-	3	-		3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment shall be based following components: Quiz / Assignment / Project / Participation in Class, given that no component shall exceed more than 10 marks.**

Course Objectives:

1. To give a general idea about Photobiology to students of all disciplines.
2. To give an idea about the role of light in life.

Course Outcomes:


1. Students will understand the role of light in basic biological functions.
2. Students will understand about radiation as a component of environment.


Unit -I


Solar Radiation – Terrestrial and Extra-terrestrial; Photoreceptors and Photo-biological responses in Plants and Animals; Absorption and Action Spectra

Unit – II

Photosynthesis – Primary Light Reactions; Photosystem I and II; Electron Transport Chain and Photophosphorylation; Calvin Cycle and Carbon Fixation in C₃, C₄ and CAM Plants; Photorespiration


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BTUGE02 Photobiology

Unit – III

Photomorphogenesis and discovery of Phytochrome; Properties and Mechanism of Phytochrome; Cryptochrome – blue light photoreceptors.

Unit – IV

Photoperiodism and Physiology of Flowering; Circadian Rhythms and Vernalization


Vision cycle; Photoperiodism in Animals


Unit – V

Ozone hole and UV – B Radiation; Biological effects of UV – B; UV – B and Plant Metabolism; UV – B Environmental and Agricultural Importance.

BOOKS:

1. Concepts in Photobiology: Photosynthesis and Photomorphogenesis.
2. Photobiology – the Science of Light and Life – Lars Olof Bjorn, Springer 2012.
3. Photobiology – Elli Kohe – 1995, Rene Santos, Joseph Hirschberg.
4. Textbook of Photobiology, S.R. Mishra, 2010, Discovery Publishing Pvt. Ltd.


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SEMESTER V

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTUGE03	GE	Microbial Analysis and its Applications	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment shall be based following components: Quiz / Assignment / Project / Participation in Class, given that no component shall exceed more than 10 marks.**

Course Objectives:

1. To give a comprehensive idea about the important classes of microorganisms and their importance
2. To gain a fundamental and practical understanding in the use of microbiological analysis for water, food, pharmaceuticals and in environmental samples.

Course Outcomes:

1. Student will be able to understand the salient features of microorganisms, their importance in nature and their control.
2. Student will be able to show the ability to efficiently and independently use and interpret data from microbiological analysis of the given samples.

UNIT-I –Introduction to microorganisms

Discovery of microorganisms and their significance; Classification of microorganisms; General characteristics of bacteria, viruses, algae, fungi and protozoa

UNIT – II Microbial nutrition, growth and control

Nutritional classes of bacteria; Types of media and cultivation of bacteria; Factors affecting growth, Growth curve.

Control of microorganisms - Physical methods [temperature, filtration, radiation]; Chemical methods for disinfection and sanitation


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BTUGE03 Microbial Analysis and its Applications

UNIT– III Methods of microbial analysis

Measurement of bacterial growth; Microbial Limit Test, Sterility Test, Bacterial Endotoxin Test, Phenol Coefficient Test, Most Probable Number, SPC, MIC, Bioassays, tests for antibacterial, antifungal and antiviral activity.

UNIT - IV Rapid methods of microbial analysis


Immunological methods; fluorescent, radio immunoassay, ELISA and nucleic acid probes and PCR (Polymerized chain reactions) and Biosensors


UNIT - V Quality Control and Quality Assurance

GMP, GLP, Validation, ISO and HACCP, FSSAI, National Standard Bodies, Testing Laboratories.

BOOKS:

1. Cappuccino, J. G., & Welsh, C. (2016). Microbiology: a Laboratory Manual. Benjamin-Cummings Publishing Company.
2. Collins, C. H., Lyne, P. M., Grange, J. M., & Falkinham III, J. (2004). Collins and Lyne's Microbiological Methods (8th Ed.). Arnolds.
3. Matthai, W., Berg, C. Y., & Black, J. G. (2005). Microbiology, Principles and Explorations. Boston, MA: John Wiley & Sons.
4. Pelczar, M. J., Reid, R. D., & Chan, E. C. (2001). Microbiology (5th Ed.). New York: McGraw-Hill.
5. Tille, P. M., & Forbes, B. A., Bailey & Scott's Diagnostic Microbiology. (2018) 14th Edition
6. Willey, J. M., Sherwood, L., Woolverton, C. J., Prescott, L. M., & Willey, J. M. (2011). Prescott's Microbiology (8th Ed, New York: McGraw-Hill.


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SEMESTER V

COURSE CODE	Category	COURSE NAME	TEACHING & EVALUATION SCHEME								
			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTUGE04	GE	Cancer Biology	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment shall be based following components: Quiz / Assignment / Project/ Participation in Class, given that no component shall exceed more than 10 marks.**

Course Objectives:

1. Overview of cancer from basic to clinical perspective.
2. Diagnosis, prevention and treatment of cancer.

Course Outcomes

1. Understanding types of cancer.
2. Understanding the methods for treatment of cancer.

UNIT I:

Introduction to Cancer: Cellular basis of cancer, Causes of Cancer, mechanisms underlying carcinogenesis, Signs and symptoms of Cancer.

UNIT II:

Types of cancer: Carcinoma, Sarcoma, Lymphoma, Blastoma, Benign and Malignant tumors, Metastasis, Stages of cancer.


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BTUGE04 Cancer Biology

UNIT III:

Cancer Diagnosis: Biopsy, Blood test, X-rays, CT Scans, Endoscopy.

Cancer Prevention: Dietary, Medication, Vaccination

UNIT IV:

Cancer Treatment Strategies: Conventional therapies: Primary treatment, Adjuvant treatment, Surgery, Radiation therapy, Chemotherapy.

UNIT V:

Palliative treatment, Emerging technologies for cancer treatment: Immunotherapy, gene therapy, laser therapy, Photodynamic therapy, Alternative medicine.



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SEMESTER VI

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			THEORY			-		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	-	-				
BTUGE05	GE	Bioenergy	60	20	20	-	-	3	-		3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment shall be based following components: Quiz / Assignment / Project / Participation in Class, given that no component shall exceed more than 10 marks.**

Course Objectives:

1. Introduction to Energy technologies using biomass.
2. Production of Energy from bio waste.

Course Outcome:


1. Understanding the process of Energy production from biological materials.
2. Application of bio energy techniques.
3. To Identify potential biomass feedstocks including energy crops;
4. To realise the significance of biofuels and bioenergy systems in our day to day life.


UNIT – I: Energy Resources

Types of Energy; Energy characteristics; Energy and Environment
Energy security

UNIT – II: Bioenergy concepts

Introduction of Bioenergy; Basics of Biomass technology
Biopower; Biofuels: Microbial Fuel Cells
Bioenergy: production and opportunities and challenges


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BTUGE05 Bioenergy

UNIT – III: Biomass Conversion Technology

Biochemical conversion; Hydrolysis, Enzyme and acid hydrolysis
Biofermentation; Trans-esterification; Anaerobic digestion

UNIT – IV: Bioenergy resources

Biofuels- sources and application; Biogas production from organic matter and residues
Biodiesel

UNIT – V: Sustainability and Environment


Sustainability: Theory and practices; Bioenergy and Sustainability
Waste management through microbes


PRACTICAL

Case study on Biofuel cells

BOOKS:

1. Anju Dahiya, Bioenergy: Biomass to Biofuels and Waste to Energy, 2nd edition Academic Press Inc; 2020.
2. John Love, John A. Bryant, Biofuels and Bioenergy, 1st edition, John Wiley & Sons Ltd., 2017.
3. Kenneth L. Starcher and Vaughn Nelson, Introduction to Bioenergy, 2nd edition, CRC Press.
4. Samir Kumar Khana, Bioenergy and Biofuel from Biowastes and Biomass, ASCE Publications, 2010.
5. Sunggyu Lee and Yatish T. Shah Biofuels and Bioenergy: Processes and Technologies, Taylor & Francis, 2012.


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			THEORY			PRACTICAL		Th	T	P	CREDITS
			END SEM University Exam	Two Term Exam	Teachers Assessment*	END SEM University Exam	Teachers Assessment*				
BTUGE06	GE	Genetically Modified Organisms	60	20	20	0	0	3	0	0	3

Legends: L - Lecture; T - Tutorial/Teacher Guided Student Activity; P – Practical; C - Credit;

***Teacher Assessment shall be based following components: Quiz / Assignment / Project/ Participation in Class, given that no component shall exceed more than 10 marks.**

Course Objectives:

1. Biotechnological methods for developing Genetically Modified Organisms (GMOs).
2. Genetic Engineering – current social status.

Course Outcomes

1. Understanding the science behind GMO's.
2. Benefits and risks of GMO's.

UNIT- I: Overview of GMOs

From domestication to DNA; Crop domestication and The Green Revolution; Food evolution; Conventional and bio-food; Plant genetic engineering: Status and methods; Brief overview of GMOs; Need for GMOs; How science works; Scientific consensus.

UNIT- II: Biology behind the GMOs

Genes, genomes and genetic engineering; Diversity of genetic modification methods; New biotechnological methods: Gene editing and basic methods to isolate and manipulate genes, and transfer them into plants, animals, and microbes; Genetically modified food of plant and animal origin; Genetically modified food- pros and cons.


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BTUGE06 Genetically Modified Organisms

UNIT- III: Successful and popular GMOs

Genetically modified plants and crops; Genetically modified medicines; Genetically modified animals; GMOs in commercial use, and on the horizon for use in the near to mid-term, including insect-resistant plants, herbicide-resistant crops, medicine-producing livestock, and growth enhanced fish, dietary supplements and the case of nitrite/ates; Modified agricultural practices; Deeper dive on animal biotechnology.

UNIT- IV: Challenges & Opportunities of GMOs


Environmental, health and ethical context of GMOs; Advantages of transgenic organisms; Risks associated with the creation of GMOs; Limitations of this science; Emergent and Persistent Problems; Biofortification; Potential hazards resulting from the consumption of genetically modified food by animals and the final consumer – human; How biotechnology intersects with globalization, trade, poverty, food security, and environmental sustainability.


UNIT- V: Politics and Society

Regulating GMOs; Law on GMOs; New food safety laws; Patents and intellectual property; Public vs. scientist credibility; Ethical values and perspectives; Reasons for ideological as well as legal and ecological concerns; Monsanto; The Papaya Puzzle; Forbidden Fruit; Cascade Effects; GMOs and you; Individual Choice.

BOOKS:

1. Desmond S. T. Nicholl (2008). An introduction to Genetic Engineering. (3rd Edition). Cambridge University Press.
2. Krimsky S. (2019). GMOs Decoded-A Skeptic's View of Genetically Modified Foods.
3. Parekh, Sarad R. (2004). The GMO Handbook: Genetically Modified Animals, Microbes, and Plants in Biotechnology. (1st Edition). Humana Press.
4. Watson R., Preedy V. (2015). Genetically Modified Organisms in Food. (1st Edition). Elsevier.


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