

**SCHEME AND SYLLABUS OF
CERTIFICATE COURSE**

IN

**BIOFUEL TECHNOLOGY
(w.e.f. academic session 2022-23)**

**Department of Microbiology and
Bioinformatics**

Atal Bihari Vajpayee Vishwavidyalaya

Bilaspur (C.G.)

**(A State University, Established by the Government of
Chhattisgarh)**

1. About the Department

Department of Microbiology and Bioinformatics was established in Atal Bihari Vajpayee Vishwavidyalaya (formerly Bilaspur University), in the year 2013, with the objective of imparting quality education in the field of Microbiology and Bioinformatics. The Department has always produced quality professionals, holding important positions in Microbiology and Bioinformatics industry in Chhattisgarh, India and abroad. The Department has excellent infrastructure with well equipped laboratories for conducting teaching, learning and research in the areas of Microbiology, Bioinformatics, Biotechnology, Botany and relevant disciplines. The Department has well qualified and experienced faculty members, who were always engaged with teaching and research. The staff holds funding from various government organizations and has published good number of books and research publications in reputed journals.

2. About the Course

The certificate programme in Biofuel Technology is recognized qualification provides better understanding on biological concept, applications and analysis of big data from available biological databases. Those completing the course are awarded a CERTIFICATE and will be able to apply this knowledge for solving problems and making decisions associated with the technical and practical applications in biofuel preparation and methods.

3. Scope:

Biofuel Technology has a wide scope and opportunities all around the world. The certificate course provides job-oriented knowledge and applications in scientific methods which caters the need of society. Biofuels has wide scope in education, software industries, pharmaceuticals, medical, marketing and several platforms in research.

4. Outcome of the Course:

- To impart comprehensive overview of the scientific and technical aspects of Biofuel Technology.
- To workout in Biofuel manufacturing and marketing
- To conduct several designing process and application in preparation of oils

5. Eligibility Criteria

All those who have completed their Senior School Certificate Examination (Class XII).

6. Fees Structure

One time registration/tuition fees of Rs. 3000/-

7. Intake – 15 seats

8. Course Duration – 6 months/ 24 weeks.

9. Attendance

Minimum attendance of 75 % is required in the classes for appearing in the examination.

10. COURSE SCHEME :

S. No.	Papers	Maximum Marks	Minimum Marks	Credits
1.	Paper I- Theory (Biofuel Technology)	100	40	4
2.	Paper II- Practical (Biofuel Technology Lab)	100	40	2
Total marks/ Credits		200	80	6

11. Syllabus

Theory

Title: Biofuel Technology

- Module 1. Introduction: Biofuels overview, Conventional biomass, Aquatic biomass.
- Module 2. Renewable and non-renewable resources: Basics of electricity generation using steam, the composition of coal, products from combustion of coal, environmental damage from coal.
- Module 3. Petroleum and fuel consumption, Supply-Demand, Biofuel
- Module 4. Chemistry of fats and oils, Processing of fats and oils to make biodiesel and biojet fuels
- Module 5. Biochemistry of enzymes.
- Module 6. Advanced biofuels: lignocellulosic bioethanol, plant biofuels, bacterial biofuels, algal biofuels.
- Module 7. Corn Ethanol: Feedstock, Dry milling process, Wet milling process, Fermentation, distillation processes, Energy yield, Economics.
- Module 8. Algae Types: *Botryococcus braunii*, *Chlorella*, *Dunaliella tertiolecta*, *Gracilaria*, *Pleurochrysis carterae*, *Sargassum*.
- Module 9. Biodiesel: Feedstock, Trans-esterification, Thermal depolymerization, Energy yield, Economics.
- Module 10. Algae Cultivation: Environmental conditions, Open pond, Closed loop system, Photobioreactors.
- Module 11. Sugarcane: Feedstock, Milling and refining, Fermentation, distillation processes, Energy yield, Economics.
- Module 12. Algae Biofuel Product & Processes: Chemical processes, Bio-diesel, Thermochemical processes, Biochemical processes, Bio-ethanol, Bio-butanol, Bio-methanol, Bio-hydrogen.
- Module 13. Chemical processing to produce ethanol, butanol, and other chemicals
- Module 14. Anaerobic digestion and other gases.
- Module 15. Basics of petroleum refining, Chemistry of liquid fuels for various engines
- Module 16. Challenges: Pipeline operations, Rail economics, MEOR technology
- Module 17. Biofuels in healthcare systems.
- Module 18. Biofuel Marketing: Global supply projections, Need for alternate biomass sources.

Laboratory

Title: Biofuel Technology lab

1. Isolation of biogas
2. Isolation of oil from seeds
3. Isolation of biodiesel
4. Isolation of bioethanol
5. Isolation of bacterial biofuels
6. Isolation of algal biofuels
7. Antimicrobial analysis of biofuels in healthcare systems
8. Anticancer activity of biofuels in healthcare systems

Suggested Books

1. Biorenewable Resources: Engineering New Products from Agriculture by Robert C. Brown, Wiley-Blackwell.
2. Biomass for Renewable Energy, Fuels, and Chemicals by Donald Klass, Academic Press Publications.
3. Gasoline, Diesel and Ethanol Biofuels from Grasses and Plants by Ram B. Gupta and Ayhan Demirbas, Cambridge University Press.
4. Biofuels Engineering Process Technology by Cave Drapcho, John Nghiem, and Terry Walker, McGraw Hill Publications.

Online resources

<https://www.britannica.com>
<https://encyclopedia2.thefreedictionary.com>
<http://www.free-ebooks.net/>
<https://www.scribd.com>
<https://www.wikipedia.org/>

BUDGET PLAN FOR THE CERTIFICATE COURSE

S.No.	Income /course	Amount (in Rupees)
a)	Intake- 15 candidates with course fee 3000 rupees	45,000/-
S.No.	Expenditure Detail	Amount (in Rupees)
1.	Instruments and tools (one time)	0 (Established)
2.	Contingencies	8,000/-
3.	Stationary and printing	10,000/-
4.	TA and Conveyance	--
5.	Teaching (300 per class - 40 classes)	12,000
6.	Total	30,000

Year wise plan

S.No.	Expenditure Detail	Amount (in Rupees)
1.	For first year	30,000/-
2.	From second year (Contingencies and Teaching)	20,000/-