

# 136C2A Microbial Physiology Theory Summary

## Course Units

### ***Unit 1: Basic Principles Of Microbial Growth***

- Physiology of Microbial Growth: Batch – continuous - synchronous cultures;
- Growth curve and measurement method (turbidity, biomass, and cell count).
- Control of microbial growth.

### ***Unit 2: Basic Concepts Of Aerobic And Anaerobic Metabolic Pathways***

- Nutrition Requirements - Photoautotrophs, photoorganotrophs, chemolithotrophs (Ammonia, Nitrite, Sulfur, Hydrogen, Iron oxidizing Bacteria), chemoorganotrophs.
- Nutrition transport mechanisms – Passive diffusion and Active transport.
- Factors affecting microbial growth.

### ***Unit 3: Nalyze The Role Of Individual Components In Overall***

- An overview of Metabolism - Embden Meyerhof Pathway, Entner- Doudoroff Pathway, Pentose Phosphate Pathway, Tricarboxylic Acid Cycle.
- Electron Transport Chain and Oxidative Phosphorylation.
- ATP synthesis.
- Fermentation-Homolactic Fermentation, Heterolactic Fermentation, Mixed Acid Fermentation, Butanediol Fermentation.

### ***Unit 4: Provide Information On Sources Of Energy And Its***

- Photosynthesis - An overview of chloroplast structure.
- Photosynthetic Pigments, Light Reaction-Cyclic and non-cyclic Photophosphorylation.
- Dark Reaction - Calvin Cycle.

### ***Unit 5: Different Types Of Metabolic Strategies***

- Bacterial reproduction - Binary fission, Budding, Reproduction through conidia, cyst formation, endospore formation.
- Fungi asexual and sexual reproduction, Microalgae reproduction.
- Asexual and sexual reproduction of protozoa.

## Course Outcomes

**CO1:** Describe microorganisms based on nutrition.

**CO2:** Know the concept of microbial growth and identify the factors affecting bacterial growth.

**CO3:** Explain the methods of nutrient uptake.

**CO4:** Describe anaerobic and aerobic energy production.

**CO5:** Elaborate on the process of bacterial photosynthesis and reproduction.

## **Text Books**

1. Schlegel, H.G. (1993). General Microbiology.,7th Edition, Press syndicate of the University of Cambridge.
2. RajapandianK.(2010). Microbial Physiology, Chennai: PBS Book Enterprises India.
3. MeenaKumari. S. Microbial Physiology, Chennai 1st Edition MJP Publishers 2006.
4. Dubey R.C. and Maheswari, S. (2003). A textbook of Microbiology, New Delhi: S. Chand & Co.
5. S. Ram Reddy, S.M. Reddy (2008). Microbial Physiology. Anmol Publications Pvt Ltd.

## **Reference Books**

1. Robert K. Poole (2004). Advances in Microbial Physiology, Elsevier Academic Press, New York, Volume 49.
2. Kim B.H., Gadd G.M. (2008). Bacterial Physiology and Metabolism. Cambridge University Press, Cambridge.
3. Daniel R. Caldwell. (1995). Microbial Physiology & Metabolism Wm.C. Brown Communications, Inc. USA.
4. Moat, A.G and J.W Foaster (1995). Microbial Physiology, 3rd edition. Wiley – LISS, A John Wiley & Sons. Inc. Publications.
5. BhanuShrivastava. (2011). Microbial Physiology and Metabolism: Study of Microbial Physiology and Metabolism. Lambert academic Publication.

## **Web Resources**

1. <https://sites.google.com/site/microbialphysiologyoddsem/teaching-contents>
2. <https://courses.lumenlearning.com/boundless-microbiology/chapter/microbial-Nutrition>
3. [https://onlinecourses.swayam2.ac.in/cec20\\_bt14/preview](https://onlinecourses.swayam2.ac.in/cec20_bt14/preview)
4. [http://web.iitd.ac.in/~amittal/2007\\_Addy\\_Enzymes\\_Chapter.pdf](http://web.iitd.ac.in/~amittal/2007_Addy_Enzymes_Chapter.pdf)
5. <https://www.frontiersin.org/microbial-physiology-and-metabolism>