

COURSE PREFIX/NO: TEL 240
COURSE TITLE: Fiber Optics Theory
LEC HRS/WEEK: 2.0
LAB HRS/WEEK: 0.0
CREDIT HRS/SEMESTER: 2.0

[Distance Learning Attendance/VA Statement](#)
[Textbook Information](#)

COURSE DESCRIPTION:

This course is a study of the basic theory of fiber optics transmission. Topics include O/E conversions, multiplexer design and SONET standards.

COURSE COMPETENCIES:

Upon successful completion of this course, the student should be competent to perform the following tasks:

Module 1: Principles, Characteristics and Fabrication of Fiber

- Classify the wavelengths of visible light, IR and UV
- Calculate the Index of refraction
- Describe reflection and refraction
- Calculate the critical angle
- Describe Snell's Law
- Describe the fiber optic core and cladding
- Describe Single mode and Multi mode
- Describe Attenuation and Dispersion

Module 2: Transmitters, Receivers and Other Optical Devices

- Identify the electronic devices needed to convert electrons to photons and photons to electrons
- Discuss the source to fiber coupling requirements
- Discuss the impact of noise on fiber systems
- Explain the difference between modulation and demodulation.
- Explain the difference between multiplexers and demultiplexers
- Discuss the impact of MEMs.

Module 3: Signals, Networks and Systems

- Identify the optical signal formats
- Identify the optical network transport protocols
- Describe the SONET (Synchronous Optical Network) and NG-SONET standards
- Discuss the system design considerations
- Discuss special fiber optic communication systems such as Soliton, Coherent, Optical CDMA,

Module 4: Test and Measurement

- Identify the types of optical power measurements and the instruments used to measured optical power.

- Identify the types of optical wavelength measurements and the instruments used to measure optical wavelength.
- Identify the types of signal measurements and the instruments used to measure the optical signal strength.

MINIMAL STANDARDS/PERFORMANCE OBJECTIVES:

Module 1: Principles, Characteristics and Fabrication of Fiber

- Given notes and the textbook, the student will be able to correctly classify the wavelength of visible light, infra red and ultra violet to the satisfaction of the instructor.
- Given notes and the textbook, the student will be able to calculate the index of refraction and the critical angle (using Snell's Law) with a 80% accuracy.
- Given notes and the textbook, the student will be able to correctly describe fiber core, fiber cladding, reflection, refraction, single mode, multi mode, attenuation and dispersion.

Module 2: Transmitters, Receivers and Other Optical Devices

- Given notes and the textbook, the student will be able to correctly identify the electronic devices need to convert photons to electrons.
- Given notes and the textbook, the student will be able to correctly identify the electronic devices need to convert electrons to photons.
- Given notes and the textbook, the student will be able to correctly list the source to fiber and fiber to source coupling requirements.
- Given notes and the textbook, the student will be able to correctly identify the different types of noise and discuss their impact on the signal.
- Given notes and the textbook, the student will be able to compare modulators to demodulators to the instructor's satisfaction.
- Given notes and the textbook, the student will be able to compare multiplexers to demultiplexers to the instructor's satisfaction.
- Given notes and the textbook, the student will be able to discuss the impact of MEMs on fiber optic communication to the instructor's satisfaction.

Module 3: Signals, Networks and Systems

- Given notes and the textbook, the student will be able to correctly identify the optical signal formats.
- Given notes and the textbook, the student will be able to correctly identify the optical signal transports protocols.
- Given notes and the textbook, the student will be able to correctly describe the SONET framework.
- Given notes and the textbook, the student will be able to correctly identify the SONET speeds.
- Given notes and the textbook, the student will be able to identify the four SONET layers.
- Given notes and the textbook, the student will be able to correctly system design considerations.

Module 4: Test and Measurement

- Given notes and the textbook, the student will be able to correctly identify the types of optical power measurements and the instruments used to measured optical power.
- Given notes and the textbook, the student will be able to correctly identify the types of optical wavelength measurements and the instruments used to measure optical wavelength.
- Given notes and the textbook, the student will be able to correctly identify the types of signal measurements and the instruments used to measure the optical signal strength.

COURSE REQUIREMENTS

Students are responsible for attaining competencies through completion of the following course requirements:

ATTENDANCE

Students are responsible for attending all scheduled meetings in the courses in which they are enrolled **until they have completed all course requirements**. Students are responsible for all material covered and for all assignments made in all classes. Students who are absent from a class more than 10 percent of the hours assigned may be withdrawn. A grade of "W" is assigned if the student's last date of attendance is on or before mid-term. If a student is withdrawn from a course and the last date of attendance is after mid-term, the grade assigned may be a "W" or a "WF." The attendance policy also applies to students enrolled in telecourses or online courses. "Attendance" is established for telecourses through contacting the instructor, turning in assignments, and completing tests. "Attendance" is established for online courses by contacting the instructor, logging into the course on a regular basis, and completing assignments and tests. The attendance procedure for online and telecourse students is available through the course syllabus.

STUDENT CONDUCT

York Technical College adheres to the South Carolina TECH Student Code and Grievance Procedure, approved by the State Board for Technical and Comprehensive Education on November 13, 2003. (Copies of this *Student Code and Grievance Procedure* are available in the College Library, the Industrial & Engineering Technologies Division Offices in Building C and D, the Business, Computer, Arts & Sciences Division Office in Building A, the Health & Human Services Division Office in Building A, the Student Government Association Office in the Student Center, in the Student Services Building., and on the College's website.) It is the policy of York Technical College that the *Student Code and Grievance Procedure* shall govern conduct and guarantee due process for students enrolled at the College. The College expects all students to conduct themselves with dignity and to maintain high standards of responsible citizenship. The regulations which follow are significant and students are expected to become familiar with them:

1. The College reserves the right to decline admission, to suspend, or to require the withdrawal of anyone whose conduct is disruptive to the educational process.
2. The possession or consumption of alcoholic beverages or other drugs by a student while on College property is prohibited and is grounds for dismissal. York Technical College does not sanction the use of alcoholic beverages at any event involving students of the College.
3. Children are not permitted in classrooms, shops or labs. Children should not be left unattended at any time on campus.
4. Any student caught cheating or involved in any other academic dishonesty will be given a grade of zero and will be subject to further disciplinary action.
5. All students should display a current parking decal on their vehicle and abide by the parking regulations provided.
6. Students are not permitted to eat or drink in the library or labs. Eating and/or drinking in classrooms is left to the discretion of the instructor. Smoking is permitted only in personal vehicles.

COMPLETING ASSIGNED HOMEWORK AND TESTS.

EVALUATION STRATEGIES/GRADING:

The following scale will be the standard:

Grade Score

- A 90 - 100
- B 80 - 89
- C 70 - 79
- D 60 - 69
- F below 60

Each Module will count equally toward the final grade. Each module will have at least one test.

Final grades will be determined as follows:

| | |
|---------------------|------|
| Major Tests | 60 % |
| Homework | 15 % |
| Instructor Options | 15 % |
| Work Ethics | 10% |
| Timeliness | |
| Quality | |
| Communication | |
| Professional ethics | |
| Self motivation | |

The instructor options will be discussed with the students during the first week of class. These options may include additional homework, spot quizzes or written reports. Assessment method of these options will be distributed with the assignment

ENTRY-LEVEL SKILLS: Graduate of an associate degree program or experience in the telecommunications industry.

PREREQUISITES: None

CO-REQUISITES: None

Disabilities Statement: Any student who feels s/he may need an accommodation based on the impact of a disability should contact the Special Resources Offices (SR) at 803-327-8007 in the 300 area of Student Services. The SRO coordinates reasonable accommodations for students with documented disabilities.