Wharton County Junior College

Administrative Master Syllabus

Course Information

Course Title	Nuclear Fundamentals I
Course Prefix, Num. and Title	NUCP 1370 Nuclear Fundamentals I
Division	Vocational Science
Department	Nuclear Power Technology
Course Type	WECM Course
Course Catalog Description	Introduces the student to theory and systems that are foundational to nuclear power plants. Theory topics include nuclear physics, nuclear fission, neutron life cycle, heat transfer, fluid flow, radiation detection and properties of materials used in nuclear plants. Basic overview of specific systems associated with the primary side of a nuclear power plant is included.
Pre-Requisites	ENER 1350 or PTAC 1302
Co-Requisites	None

Semester Credit Hours

Total Semester Credit Hours (SCH): Lecture Hours: Lab/Other Hours	3:3:0
Equated Pay Hours	3
Lab/Other Hours Breakdown: Lab Hours	Enter Lab Hours Here.
Lab/Other Hours Breakdown: Clinical Hours	Enter Clinical Hours Here.
Lab/Other Hours Breakdown: Practicum Hours	Enter Practicum Hours Here.
Other Hours Breakdown	List Total Lab/Other Hours Here.

Approval Signatures

Title	Signature	Date
Department Head:	Daniel L Johnson Digitally signed by Daniel L Johnson Date: 2023.10.19 16:55:54 -05'00'	10/19/23
Division Chair:	Timothy Guin Digitally signed by Timothy Guin Date: 2023.10.20 13:20:15 -05'00'	10/20/23
VPI:		

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Additional Course Information

Topical Outline: Each offering of this course must include the following topics (be sure to include information regarding lab, practicum, and clinical or other non-lecture instruction).

TOPICAL OUTLINE	DEDICATED INSTRUCTIONAL TIME
Classical Physics	16 hours
Basic Atomic & Nuclear Physics	8 hours
Introduction to Nuclear Power	2 hours
Nuclear Fission	1 hour
Neutron Life Cycle	1 hour
Properties of Reactor Plant Materials	8 hours
Radiation Detection	4 hours
Fluid Flow	5 hours
Heat Transfer	5 hours
Heat Exchangers	2 hours
Reactor Coolant Systems	3 hours
Reactor Vessel & Internals	1 hour
Component Cooling & Essential Cooling Water	1 hour
Chemical & Volume Control	2 hours
Residual Heat Removal	1 hour
Reactor Containment Building	1 hour
Reactor Protection & Control	1 hour
Engineered Safety Features/ECCS	2 hours

Lab Work:
None, except as required for lecture demonstration
One Week

Course Learning Outcomes:

Learning Outcomes – Upon successful completion of this course, students will:

1. Explain fundamental theory concepts used in classical, atomic and nuclear physics and the neutron life cycle.
2. Explain properties of materials used in a Nuclear Reactor Plant.
3. Describe basic nuclear power plant primary systems.

Methods of Assessment:

Periodic written quizzes and exams.
Periodic written quizzes and exams.
Exam analysis will be performed to identify weaknesses in program.

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Required text(s), optional text(s) and/or materials to be supplied by the student:

Course specific text will be specified and/or industry specific handouts will be provided.

Suggested Course Maximum:

35

List any specific or physical requirements beyond a typical classroom required to teach the course.

None, except lab use as needed for lecture demonstration.

Course Requirements/Grading System:

Describe any course specific requirements such as research papers or reading assignments and the generalized grading format for the course.

1. Quizzes, homework assignments, projects, and class participation 25%
2. Lab, and Cross Disciplinary Skills (work ethic, safety, teamwork, housekeeping, attitude) 25%
3. Mid-term Exam 25%
4. Final Examination 25%

90 to 100: A
80 to 89: B
70 to 79: C
60 to 69: D
0 to 59: F
Note: For the additional NUCP certificate, the student must complete the course with a minimum of 80% Note: For the additional NUCP certificate, the student must complete the course with a minimum of 80%.

Curriculum Checklist:

☐**Administrative General Education Course** (from ACGM, but not in WCJC Core) – No additional documents needed.

☐**Administrative WCJC Core Course** – Attach the Core Curriculum Review Forms

- ☐Critical Thinking
- ☐Communication
- ☐Empirical & Quantitative Skills
- ☐Teamwork
- ☐Social Responsibility
- ☐Personal Responsibility

☒**WECM Course** – If needed, revise the Program SCANS Matrix and Competencies Checklist