STATE UNIVERSITY OF NEW YORK
COLLEGE OF TECHNOLOGY
CANTON, NEW YORK

MASTER SYLLABUS

MECH 443 – Technical Propulsions

Created by: Dr. Lucas Craig
Updated by:

Canino School of Engineering
Mechanical Engineering Technology
Fall 2021

A. **TITLE**: Technical Propulsions

B. **COURSE NUMBER: MECH 443**

C. **CREDIT HOURS (Hours of Lecture, Laboratory, Recitation, Tutorial, Activity):**

 # Credit Hours: 3
 # Lecture Hours per Week: Two-1-hour lectures
 # Lab Hours per Week:
Other per Week: One-2-hour recitation

Course Length (# of Weeks): 15

D. **WRITING INTENSIVE COURSE**: NO

E. **GER CATEGORY: NO**

F. **SEMESTER(S) OFFERED:** Fall

G. **COURSE DESCRIPTION:**

This course investigates propulsions systems. Conservation of momentum, mass, and energy are applied to many types of propulsions systems. The course examines and analyzes propeller design (airplane and boat), turbojets, turboprops, ramjets, and rockets.

H. **PRE-REQUISITES/CO-REQUISITES:**

a. Pre-requisite(s): MECH 301 (Technical Dynamics), MECH 342 (Thermodynamics), and MATH 364 (Differential Equations)
b. Co-requisite(s):
c. Pre- or co-requisite(s): MECH 341 (Intermediate Fluid Mechanics)

I. **STUDENT LEARNING OUTCOMES:**

Course Student Learning Outcome [SLO]	*PSLO*	*GER*	*ISLO*
a. Analyze conservation of mass, momentum, and energy to develop thrust equations	1		2 - Critical Analysis, (CA)
b. Apply propulsion principles to aircraft and boats with propellers	1		2 - Critical Analysis , (CA)
c. Apply thermodynamics to air-breathing engines	1		2 - Critical Analysis , (CA)
d. Analyze rocket propulsion	1		2- Critical Analysis , (CA)

KEY	**Institutional Student Learning Outcomes [ISLO 1 – 5]**
ISLO #	**ISLO & Subsets**
1	**Communication Skills** Oral [O], Written [W]
2	**Critical Thinking** *Critical Analysis [CA] , Inquiry & Analysis [IA] , Problem Solving [PS]*
3	**Foundational Skills** *Information Management [IM], Quantitative Lit,/Reasoning [QTR]*
4	**Social Responsibility** *Ethical Reasoning [ER], Global Learning [GL], Intercultural Knowledge [IK], Teamwork [T]*
5	**Industry, Professional, Discipline Specific Knowledge and Skills**

J. APPLIED LEARNING COMPONENT: **Yes___x___ No_____**

If Yes, select one or more of the following categories:

Classroom/Lab__x_
Internship___
Clinical Practicum___
Practicum___
Service Learning___
Community Service___
Civic Engagement___
Creative Works/Senior Project___
Research___
Entrepreneurship___
(program, class, project)

K. TEXTS:

Cengel, Yunus A. and Michael A. Boles, 2015: Thermodynamics An Engineering Approach (8th edition). McGraw Hill Companies Inc.

Cengel, Yunus A. and Cimbala, John M., Fluid Mechanics 3e , McGraw-Hill 2014., ISBN: 9780073380322.

L. REFERENCES: N/A

M. EQUIPMENT: N/A

N. GRADING METHOD: A-F

O. SUGGESTED MEASUREMENT CRITERIA/METHODS:
Homework, Exams, Projects

P. DETAILED COURSE OUTLINE:

- **A. Review of mechanics of fluid mechanics and thermodynamics**
  - **a. Conservation of mass, momentum, and energy**
  - **b. Isentropic flow**
  - **c. Nozzles**
  - **d. Shocks**
  - **e. Thrust equation development**
- **B. Propeller Design**
  - **a. Propeller fundamentals**
  - **b. Curves**
  - **c. Disk theory**
  - **d. Prop design for aircraft and boats**
- **C. Air-breathing engines**
  - **a. Jet engines**
  - **b. Subsonic and supersonic inlets and diffusers**
  - **c. Ramjets**
  - **d. Turbojets**
  - **e. Turboprops**
- **D. Performance of rocket engines**
  - **a. Shock development inside the nozzle**
  - **b. Chemical propellants**
  - **c. Electrical propulsion**

Q. LABORATORY OUTLINE: N/A