



MECHATRONICS

Course Syllabus –SMCSI-Center for Science and Industry

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Course Overview

This course is intended to expose students to the many different engineering fields and will be delivered over two semesters. High school students will be introduced to some of the tools and methods used by “real world” engineers. The cornerstone of the course is to design projects which will be completed throughout the course. This design project will address many of the goals and objectives outlined below.

Specific topic coverage includes:

- Demonstrate effective technical communication and teamwork.
- Research a case study for the projects.
- Perform the job role of selected engineering professions.
- Apply the steps of a design process to an engineering project.
- Use standard engineering graphical methods to communicate a design to others.

Introduction

Upon graduation you will either enter the world of work or continue your education. Mechatronics class will assist you in either case, providing you with an exposure to a variety of engineering and technical careers. Throughout this class you will be required to utilize the skills you have acquired in other courses to explore the impact of technological systems, processes, materials, and tools used to facilitate solutions to problems. No matter what occupation you choose to pursue, there are some common practices and principles that are a must for success.

Competencies

BASIC SKILLS: Reads, writes, performs arithmetic and mathematical operations, listens and speaks.

1. Reading – locates, understands, and interprets written information and documents such as manuals, graphs and schedules.
2. Writing – Communicates thoughts, ideas, information and messages in writing
3. Mathematics – Performs basic computations and approaches practical problems by choosing appropriately from a variety of mathematical techniques.
4. Listening – receives, attends to, interprets, and responds to verbal messages.
5. Speaking – organizes ideas and communicates orally

THINKING SKILLS: Thinks creatively, makes decisions, solves problems, visualizes, knows how to learn, and reasons.

1. Creative Thinking – generates new ideas.
2. Decision Making – specifies goals and constraints, generates alternatives, considers risks, and evaluates and chooses best alternative.
3. Problem Solving – recognizes problems and devises and implements plan of action.
4. Seeing Things in the Mind’s Eye – organizes, and processes symbols, pictures, graphs, objects and other information.
5. Knowing How to Learn – uses efficient learning techniques to acquire and apply new knowledge and skills.
6. Reasoning – discovers a rule or principle underlying the relationship between two or more objects and applies it when solving a problem.

PERSONAL QUALITIES: Displays responsibility, self –esteem, sociability, self-management, and integrity and honesty.

1. Responsibility – exerts a high level of effort and preserves towards goal attainment.
2. Self-Esteem – believes in own self-worth and maintains a positive view of self.
3. Sociability – demonstrates understanding, friendliness, adaptability, empathy, and politeness in group settings
4. Self-Management – assesses self accurately, sets personal goals, monitors progress, and exhibits self-control.
5. Integrity/Honesty – chooses ethical courses of action

Course Levels

Levels 1 & 2

(Foundations of Engineering, Technology and Engineering/Mechatronics Concepts)

SMCSI has state-of-the-art lab utilizing industry standard equipment to learn the basics of engineering practices. During the year, individual work, group work and engineering training modules will be used as students explore basic engineering practices used in industry. Students learn how to safely use equipment from basic hand and power tools to industrial robots and computer controlled milling machines. As advanced engineering skills are learned, students take on many of the challenges faced in real life engineering careers. Foundations of Engineering, Technology and Engineering/Mechatronics Concepts are the first two courses of a possible four-year track in Engineering/Mechatronics.

Level 3 & 4

(System Automation, Mechatronics, Engineering Applications and Research, Design and Project Management)

System Automation, Mechatronics, Engineering Applications and Research, Design and Project Management gives the students a deep dive opportunity to learn about all fields in Engineering and Mechatronics. This course provides students to continue use the engineering training stations. Upon completion of the trainer stations students will design and build their own master project. Some example master projects are: Can Crusher & Hovercraft, the students will then take their gained knowledge to design and build their own personal projects.

Requirements

As a student enrolled within this course you will be expected to:

- Work in a safe manner at all times
- Come to class on time – You will be tardy if you are not signed in within five minutes of arriving at SMCSI and present in the classroom at the start of class
- Respect all class rules as outlined in the student handbook
- Maintain a three-ringed notebook with notes and your mechatronics portfolio
- If you should miss class, expect to make up any written work or lab activities missed during that time within a time period discussed with your teacher. **Attendance is very important.**
- Come to class prepared to work
- Most of all, this class should be a great change of pace. Have fun and enjoy yourself! This is a chance to be creative and discover a whole new world of technology.

Grading and Evaluation Criteria

The class is based on the SKILLACE GRADING SYSTEM as follows:

100	A+	4.00	77-79	C+	2.33
93-99	A	4.00	73-76	C	2.00
90-92	A-	3.67	70-72	C-	1.67
87-89	B+	3.33	67-69	D+	1.33
83-86	B	3.00	63-66	D	1.00
80-82	B-	2.67	59-62	D-	.67

Types of evaluations will be lap scores (trainer tests and quizzes), presentations, project performance, note taking, and attendance. Depending upon class activities during each trimester, these approximate percentages may be subject to change.

PRE-ENGINEERING – Levels 1 & 2

Foundations of Engineering and Technology and Engineering/Mechatronics Concepts

40%	Lap Scores
30%	Projects
20%	Participation / Work Ethic
10%	Field Trips / Attendance

Required Trainers:
Year One Safety, Enterprise Systems, Measurement Tools, Mechanical Drives, Mechanical Fabrication 1, CAD 1, AC/DC 1, Print Reading, Robotics 1,

Required Trainers:
Year Two AC/DC 2, Pneumatics 1 and 2, CAD 2, Electrical Control Systems, Computer Control Systems, Mechanical Fabrication 2

Optional Trainers: Welding simulator, Structural Engineering, Thermal Technology, Residential Wiring

Required Trainers:
Year 3

CNC 1 and 2, CAM 1 and 2, Tabletop Mechatronics

Year 4

Industrial Certifications and Work Study

Optional Trainers:

Welding simulator, Structural Engineering, Thermal Technology, Residential Wiring