

# Mechanical Engineering Options Selection Information Session

MECH Student Services





# Options Selection Overview



Speaker:

Alexandra Wilker, Advisor & Senior Program Assistant

# Options Selection Overview

Options available in Mechanical Engineering:

- **Flex**
- **Aerospace**
- **Biomechanics & Medical Devices**
- **Energy & Environment**
- **Mechatronics**
- **Naval Architecture & Marine Engineering**

\*Class schedules for co-op and non-co-op students are available





# Early Selection

- Early Selection is for first year engineering students who are interested in MECH
- Acceptance into MECH is part of the Engineering Program Placement process; your acceptance into an Option will be conditional on you being placed in MECH and successfully completing MECH 2
- Early Selection is open for all program options
- Deadline: **February 28th at 11:59PM**



# Regular Selection

- Regular Selection is for current MECH 2 students
- Everyone must apply, whether it be to one of the specialized options or the more broad Flex Option
- MECH 2's who were placed in an option during Early Selection last year may submit an application if they no longer want to keep their Early Selection spot
- Deadline: **March 31st at 11:59PM**



# Application Package

- Applications will be collected through a Qualtrics form
  - Separate forms for Early Selection and Regular Selection
- Optional Supporting Documents:
  - Statement of Interest (250 words)
  - CV or resume
  - Unofficial transcript (grades from Workday)
  - Up to 2 pages of supplemental material
    - May include photos, screenshots, projects, reference letters, media articles, or similar



# Submitting your Application

Early Selection Form: [https://ubc.ca1.qualtrics.com/jfe/form/SV\\_88tmgF82WUxOj4O](https://ubc.ca1.qualtrics.com/jfe/form/SV_88tmgF82WUxOj4O)

Early Selection Deadline: **February 28th at 11:59PM**

Regular Selection Form: [https://ubc.ca1.qualtrics.com/jfe/form/SV\\_6JPjyi19uU5bdhl](https://ubc.ca1.qualtrics.com/jfe/form/SV_6JPjyi19uU5bdhl)

Regular Selection Deadline: **March 31st at 11:59PM**

- Submit your application via the Qualtrics form
- Please make sure you check the email you provide in your application frequently. Interview times will be communicated by email and a quick response will be required

Forms are available on our website at:

[mech.ubc.ca/undergraduate/curriculum/program-options/](http://mech.ubc.ca/undergraduate/curriculum/program-options/)





# Flex Option



Speaker:

Saxon Bishop, Advisor & Academic Services Specialist



# Why Choose the Flex Option?

- Most flexibility and choice:
  - Core of essential courses needed by almost every MECH student
  - 22 credits of technical electives!
- Most popular option
  - Customize your program
  - Explore diverse interests
  - 56% of all current 3<sup>rd</sup> & 4<sup>th</sup> year MECH students are in the Flex Option!



# Curriculum

MECH 305 Data Analysis & Mech Eng Labs

MECH 325 Machine Design

MECH 328 Mech Eng Design Project

MECH 360 Mechanics of Materials

MECH 368 Eng Measurements & Instrumentation

MECH 375 Heat Transfer

MECH 400 Professionalism & Ethics in Engineering

MECH 431 Engineering Economics

MECH 457 Mech Eng Capstone Design Project

MECH 463 Mechanical Vibrations

MECH 466 Automatic Control



+22 credits of Technical Electives

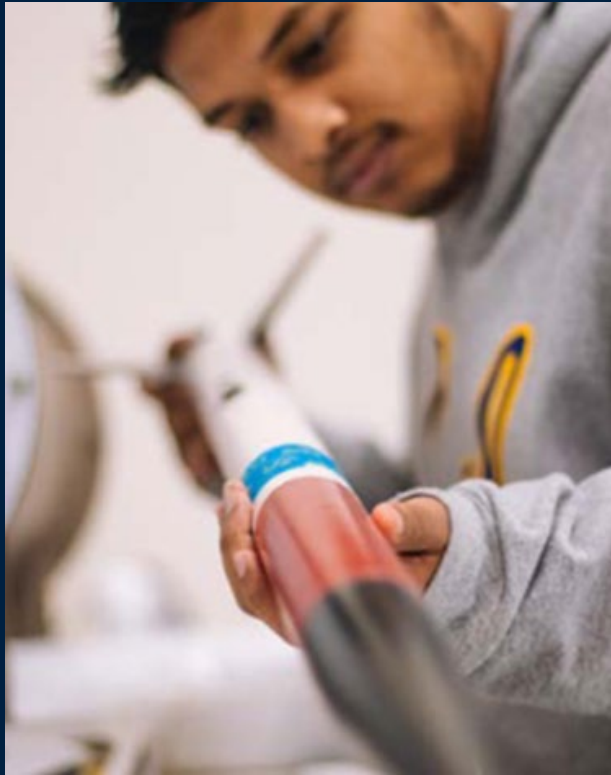
Further guidelines on Technical Electives (for all Options) are provided by MECH Student Services in the Course Planning & Registration Guide

## Where Can I Work With Flex?

Flex gives you a solid foundation in core mechanical engineering skills, preparing you for work in a wide range of areas.

Opportunities to be employed in almost every industry: product design, energy, construction, acoustics, consulting, testing, biomedical devices, vehicles, aerospace, and beyond!





# Aerospace Option



Coordinator/Speaker:  
Dr. Kendal Bushe, Associate Professor

# Why Aerospace?

Fundamental concepts like fluid dynamics, solid mechanics and thermodynamics get applied to aerodynamics, propulsion systems, aircraft aerodynamics and structures.

Career options include:

- ✦ Aircraft maintenance
- ✦ Rocket design
- ✦ Propulsion systems design





# Curriculum

MECH 305 Data Analysis & Mech Eng Labs

MECH 327 Thermodynamics II

MECH 328 Mech Eng Design Project

MECH 359 Computational Methods for Mech Eng

MECH 360 Mechanics of Materials

MECH 368 Eng Measurements & Instrumentation

MECH 375 Heat Transfer

MECH 380 Fluid Dynamics

MECH 426 Mechanical Design

MECH 463 Mechanical Vibrations

MECH 481 Aerodynamics of Aircraft I

MECH 400 Professionalism & Ethics in Engineering

MECH 431 Engineering Economics

MECH 453 Aerospace Capstone Design Project

MECH 462 Finite Element Analysis

MECH 466 Automatic Control

MECH 477 Aerospace Propulsion

MECH 479 Intro to Computational Fluid Dynamics

MECH 484 Aircraft Design: Aerodynamics

MECH 485 Aircraft Design: Structures

MECH 489 Experimental Thermofluids

MTRL 484 Materials for Aerostructures and Engines



## Research in Aerospace

Several MECH faculty members do research related to Aerospace, including (for example):

- ✦ **Carl Ollivier-Gooch** (CFD of external flows)
- ✦ **Mauricio Ponga** (crack propagation)
- ✦ **Rajeev Jaiman** (fluid/structure interactions)
- ✦ **Kendal Bushe** (combustion in gas turbines)
- ✦ **Srikanth Phani** (lattice structures)





# Biomechanics & Medical Devices Option



Coordinator/Speaker:  
Dr. Antony Hodgson, Professor

# Why Biomechanics & Medical Devices?

The Biomechanics & Medical Devices option was created to meet increasing demand for engineers with expertise in this area

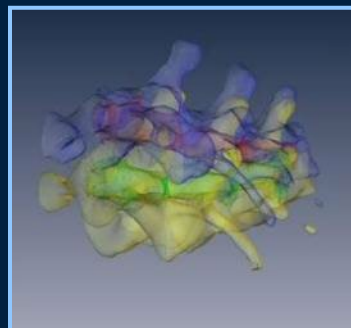
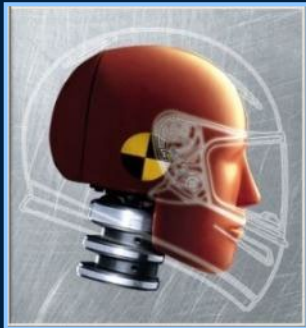
Biomechanics & Medical Devices engineering is broad, and includes:

- Medical devices
- Human injury
- Movement analysis
- Medical imaging
- Surgical innovation



# What Does the BMD Option Offer Me?

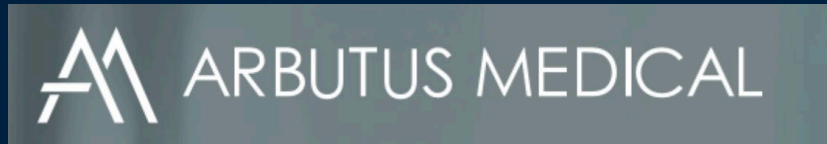
- Provides a demonstrated interest in the biomechanics & medical devices engineering field for grad studies or med school (note that med school requires additional coursework)
- Creates a sound foundation of mechanical engineering complemented with training and practical experience in biomedical engineering
- Provides specialized skills, explicit training, and a way to document your interest
- Good industrial opportunities





# Career Paths

- Industry
- Hospitals
- Medical School
- Grad School



# Curriculum

MECH 305 Data Analysis & Mech Eng Labs

MECH 325 Machine Design

MECH 328 Mech Eng Design Project

MECH 360 Mechanics of Materials

MECH 368 Eng Measurements & Instrumentation

MECH 375 Heat Transfer

MECH 463 Mechanical Vibrations

MECH 400 Professionalism & Ethics in Engineering

MECH 431 Engineering Economics

MECH 439 Biomechanics Research

MECH 459 Biomedical Capstone Design Project

MECH 466 Automatic Control

BMEG 410 Biomedical Equipment, Physiology, & Anatomy

BMEG 456 Clinical & Industrial Biomedical Engineering

MTRL 495 Biomaterials



+12 credits of Technical Electives

Of the required 12 credits, students must take 2 of:

MECH 433 (Biofluids), MECH 435 (Orthopaedic Biomechanics), or  
MECH 436 (Injury Biomechanics)

# What do Alumni/ae think?

## We asked what part of the option they appreciated the most

- Opportunity to sit in on surgeries
  - Hip, knee replacement
  - Fracture repair
- Labs
  - Anatomy and physiology
  - Human gait
- Tours
  - Hospital equipment
  - Device development
- Opportunity to see UBC research in this field
- Small class sizes in option-specific courses
- Chance to interact with profs in the field





# Energy & Environment Option

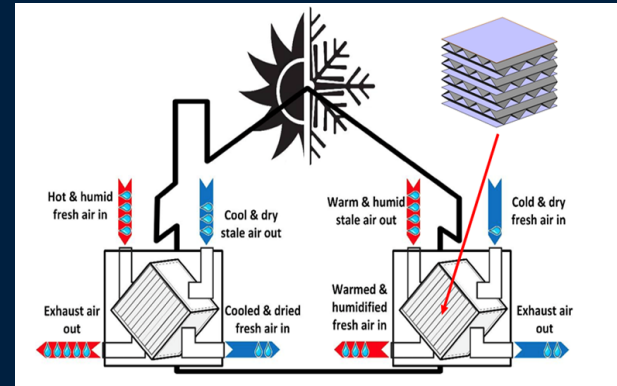
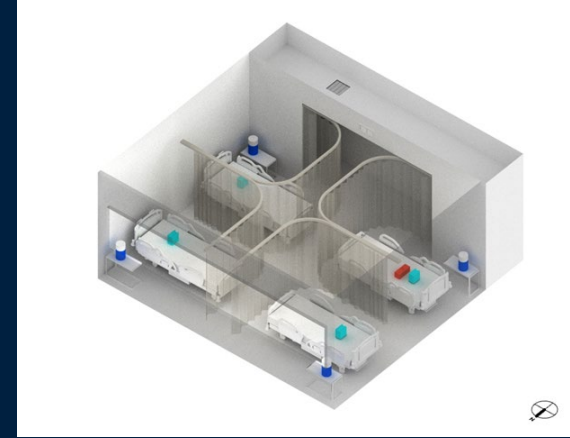
Coordinator/Speaker:  
Dr. Steve Rogak, Professor



# Why Energy & Environment?

Develop more sustainable energy systems involved in buildings, transportation and industry.

This requires use of knowledge of thermodynamics, fluid mechanics, life cycle analysis and processes of pollution formation and control, and policy design.







## Curriculum (differences from Flex Option)

MECH 327 Thermodynamics II

MECH 380 Fluid Dynamics

MECH 411 Air Pollution, Technology and Society

MECH 456 Energy & Environment Capstone Design Project

MECH 489 Experimental Thermofluids

+12 credits of Technical Electives

Of the required 12 credits, students must take at least 6 credits from:

MECH 445, MECH 473, MECH 478, MECH 479, MECH 410C/F\*, or MECH 493\*

\*permission from instructor and coordinator required



# MECH Faculty Research in Energy & Environment

- **Nima Atabaki** (Heat and Mass Transfer, HVAC)
- **Kendal Bushe** (Turbulent Combustion and Emissions)
- **Amanda Giang** (Environmental Modelling, Air Pollution, Sustainability)
- **Patrick Kirchen** (Combustion Emissions, Transportation)
- **Walter Merida** (Clean Energy Systems)
- **Steve Rogak** (Combustion emissions, Aerosols, Sustainable Buildings)
- **Alex Tavasoli** (Solar energy, Green Chemistry)
- **Naomi Zimmerman** (Air Pollution, Urban Sustainability, Climate Change)





# Thank you!





# Mechatronics Option



Coordinator/Speaker:  
Dr. Xiaoliang Jin, Associate Professor

# What is Mechatronics?



- The integration of precision mechanical design, electronics, sensors, actuators, controls and real time software engineering knowledge in the creation of a smart product
- Combining the principles of mechanical, computer, electrical, and controls engineering into a unified whole
- A fusion of disciplines that breaks down the artificial barriers between the separate disciplines



# Products Developed by Mechatronics Students



Flying magnetic table

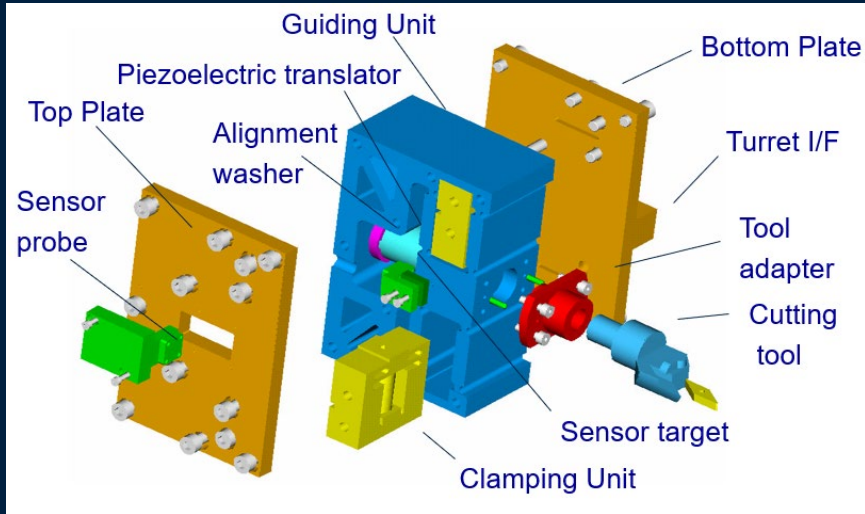


Rotating-flying-singing  
magnetic table





# Example - Design



# Curriculum

CPSC 259 Data Structures & Algorithms for  
Electrical Engineers

ELEC 302 Electronic Circuits for Electromech Design

ELEC 343 Electromechanics

MECH 306 Data Analysis & Mechatronics Labs

MECH 325 Machine Design

MECH 328 Mech Eng Design Project

MECH 360 Mechanics of Material

MECH 366 Modeling of Mechatronic Systems

MECH 375 Heat Transfer

MECH 392 Manufacturing Processes

CPEN 312 Digital Systems & Microcomputers

CPEN 333 Software Design for Engineers

MECH 400 Professionalism & Ethics in Engineering

MECH 420 Sensors & Actuators

MECH 421 Mechatronics System Instrumentation

MECH 423 Mechatronic Product Design

MECH 431 Engineering Economics

MECH 458 Mechatronics Capstone Design Project

MECH 463 Mechanical Vibrations

MECH 467 Computer Control of Mechatronics Systems



+ 3 credits of Technical Elective(s)



# Naval Architecture & Marine Engineering (NAME) Option

Coordinator/Speaker:  
Dr. Jasmin Jelovica, Associate Professor



# Why NAME?

## ➤ Career Advancement: Gain a Competitive Edge

- Acquire the skills that will allow you to work immediately after graduation in both a design office and shipyard environment.



## ➤ Unleash Your Creativity

- NAME is a beautiful **blend of art and science!** We **need creative minds** to tackle the existing and upcoming challenges.

## ➤ Take Pride in Building a Better Future

- Make a **positive impact in sustainable design** and operation of world's largest moving structures and most powerful vehicles
  - *Fast ferries, massive ships, offshore wind turbines, underwater vehicles*

## You will learn to...

- **Apply** the principles of Mechanical Engineering and Engineering Science in design and analysis of marine systems.
- **Identify** opportunities to optimize ship and other offshore structure design from sustainability point of view.
- **Address** design, construction and maintenance related challenges on wide range of marine vehicles used to exploit the ocean resources.
- **Assess** performance of various ships and offshore platforms from safety and economic perspective.



# Curriculum

MECH 305 Data Analysis & Mech Eng Labs

MECH 325 Machine Design

MECH 328 Mech Eng Design Project

MECH 359 Computational Methods for Mech Eng

MECH 360 Mechanics of Materials

MECH 368 Eng Measurements & Instrumentation

MECH 375 Heat Transfer

MECH 380 Fluid Dynamics

MECH 400 Professionalism & Ethics in Engineering

MECH 431 Engineering Economics

MECH 455 NAME Capstone Design Project

MECH 463 Mechanical Vibrations

MECH 466 Automatic Control

MECH 486 Intro to Ship Design

MECH 488 Intro to Ship Hydrodynamics

CIVL 435 Advanced Structural Analysis



+9 credits of Technical Electives

Of the required 9 credits, students must take at least 6 credits from:

MECH 327, MECH 481, MECH 491, MECH 462, MECH 473, MECH 479, MECH 478,  
MECH 489, MECH 495, MECH 410C/F\* or MECH 493\* \*permission required

Up to 3 credits may be from: NAME 501, NAME 502, or NAME 566\*

# Career Options

You are expected to find **employment in many sectors within the marine industry and beyond**. A few examples:

- Shipyards
- Engineering and Design Companies
- Classification Societies
- Government Organizations
  - Canadian Coast Guard, Transport Canada, National Research Council, etc.
- Offshore Companies
- Shipping Companies
- Education, Research and Development

