

# Manufacturing and Mechanical Systems Integration (MMSI)

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# Manufacturing and Mechanical Systems Integration (MMSI)

## Industries



Aerospace



Automotive



Defense



Health Care



Manufacturing



Pharmaceuticals

Scientific and Technical  
Consulting

Transportation and Logistics

## Outcomes

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- Nearly 100% job or further graduate studies outcomes for our graduates
- Median first-year salary; \$75k, 2019
- Job Titles: Associate Quality Engineer, Operations Test Engineer, Mechanical Engineer, Field Sales Engineer, Process Engineer

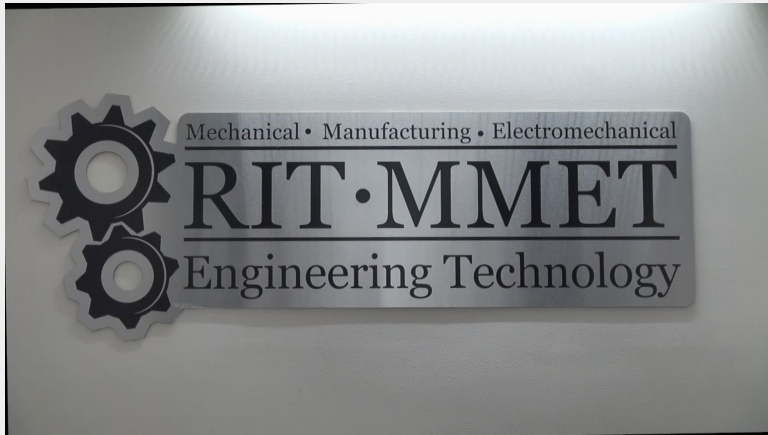
## Admissions Requirements (in part)

- Bachelors degree (or equivalent) in the field of engineering, engineering technology, or computing
- Minimum cumulative GPA of 3.0 (or equivalent)

## Exit Requirements (in part)

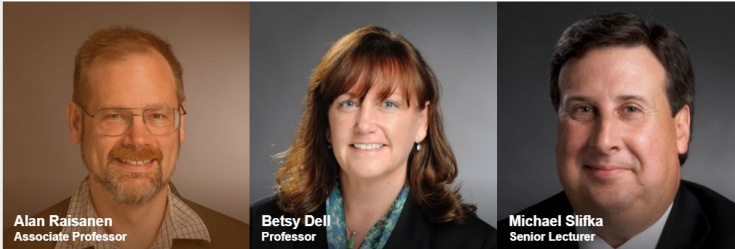
- Thesis or Capstone (Comprehensive exam option)
- 3.0 GPA in 33 credits upon graduation

# Curriculum



[Video Link](#)

[Faculty](#) (link to full list)



## Concentrations

- Advanced Mechanics
- Electronics Packaging
- Polymer Engineering & Technology
- Product Design
- Robotics and Advanced Manufacturing Systems
- Quality

## Customization

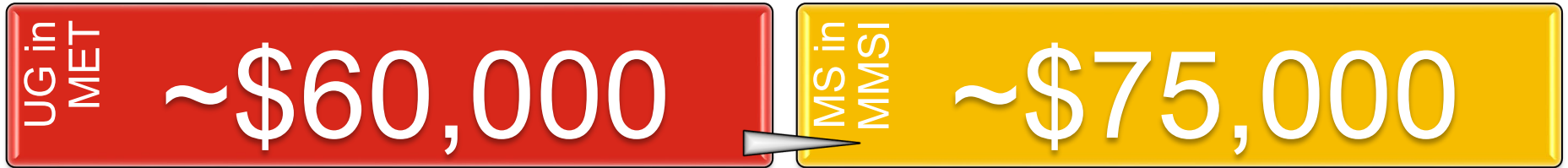
- Blend of concentrations
- Selection of research topic
- Capstone on co-op

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# Agenda

- **Why? & Career Opportunities**
- **Curriculum**
  - Research: Faculty & Effort
- **Admission & Exit Requirements**
- **Timeline**

# Salaries



## UG Job Titles

Nearly 100% had Engineer in title but some included terms like;

- Entry level
- Aid
- Associate
- Jr.
- Trainee

## Grad Job Titles

Similar titles but some included terms like;

- Manager
- Supervisor
- Owner
- Founder
- Senior
- Operations leadership
- Specialist

Applications Engineer	Mechanical Engineer
Automation Engineer	Process Engineer
Controls Systems Engineer	Product Development Engineer
Design Engineer	Project Supply Chain Manager
Lean Manufacturing Engineer	Quality Control Senior Supervisor
Manager, Continuous Improvement	Quality Engineer
Manufacturing and Production Engineer	R & D Engineer
Manufacturing Engineer	Senior Manufacturing Engineer
	Technical Program Manager

# Curriculum



## MS - Manufacturing and Mechanical System Integration (MMSI)

	Graduate Education Requirements	Core Requirements	Concentration Requirements (Choose 1 Set)	Electives	Exit Requirements	Total
# of Courses	2	4	3	1	2	12
# of Credits	3	12	9	3	6	33
1	MFET600 (F) - Graduate Seminar	1 CAST-MFET-650 (F) Manufacturing and Mechanical Systems Fundamentals		Courses from any other concentration or Technical courses approved by the graduate advisor	<i>Capstone or Thesis or Exam</i>	
2	COS-STAT-670 (S) Design of Experiments for Engineers and Scientists					
		2 CAST-MFET-730 (S) Six Sigma for Design and Manufacturing				
		3 SCB-ACCT-706 (F, S) Cost Management				
		4 SCB-DECS-744 (F, S) Project Management				

# Robotics and Advanced Manufacturing Systems

<b><u>Robotics &amp; Automation (Pick 3)</u></b>
CAST-MFET-670 (F, S) Controls for Manufacturing
CAST-MFET-685 (F,S) Robots and CNC in Int. Manufacturing
KGCOE-ISEE-610 (F, S) Systems Simulation
TCET-620 (S) Machine Learning

<b><u>Surface Mount Electronics Manufacturing (pick 3)</u></b>
CAST-MFET-655 (F) Surface Mount Electronics Manufacturing
CAST-TCET-740 (F) Fiber-Optic Telecommunications Technology
CAST-MFET-756 (S) Advanced Concepts in Surface Mount Electronics Manufacturing
COS-MTSE-601 (F) Materials Science

<b><u>Quality</u></b>
COS-STAT-621 (F) Statistical Quality Control
COS-STAT-641 (F, S) Applied Linear Models - Regression
CAST-MCET-620 (F) Robust Design & Production Systems



## Advanced Mechanics and Materials

<u>Advanced Mechanics</u>
MCET-695 (F) Applied Finite Element Analysis
MCET-621 (S) Advanced Mechanics
CAST-MCET-683 (S) Plastics Product Design

<u>Polymer Engineering &amp; Technology (pick 3)</u>
MCET-730 (F) Polymer Engineering Research Fundamentals (required)
MCET-674 (F) Fiber Reinforced Composites & MCET-675 Fiber Reinforced Composite Lab
MCET-683 (S) Plastics Product Design
MTSE-702 (S) Polymer Science

<u>Product Design (pick 3)</u>
CAST-MCET-620 (F) Robust Design & Production Systems
CAST-MCET-670 (S) Concept Design and Critical Parameter Management
CAST-MCET-720 (S) Product and Production System Development and Integration
MCET-683 (S) Plastics Product Design

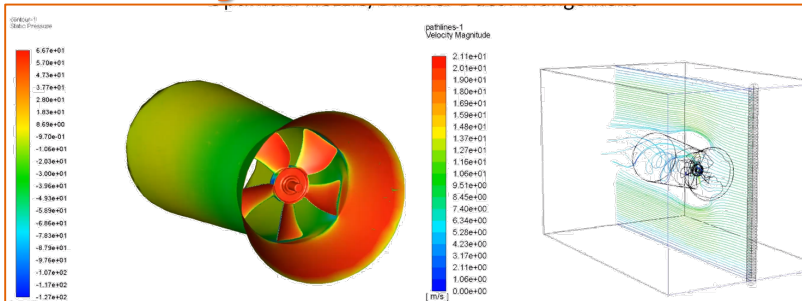
# Exit Requirements

<u>Capstone Track</u>	<u>Thesis Track</u>
CAST-MFET-797 (3 Credits) MMSI Capstone Project	CAST-MFET-788 (3 Credits) Thesis Planning
1 Additional Elective Course (3 Credits)	CAST-MFET-790 (3 Credits) Thesis

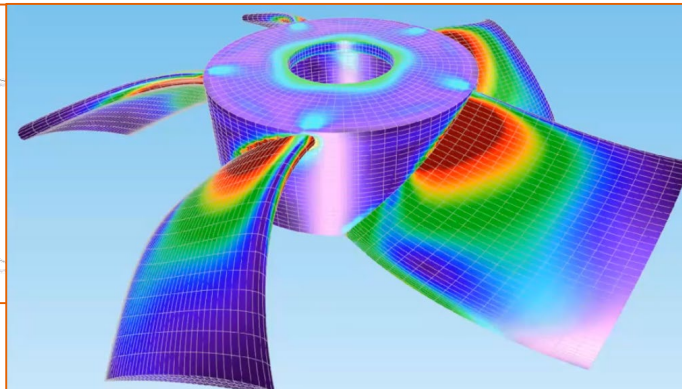
Comprehensive Exam Option

# Research: Faculty & Effort

## Fluid Dynamics



## Advanced Mechanics



## Polymers

A collage of images related to polymer research. It includes a large industrial machine, a person working at a table with orange material, a jet engine, a human skeleton, and laboratory glassware. Arrows point from these images towards a central circular area containing a jet engine and a skeleton, suggesting the application of polymer research in aerospace and biomedical fields.

## Spray Physics

**Respiratory disease is the leading cause of death in children under five.**

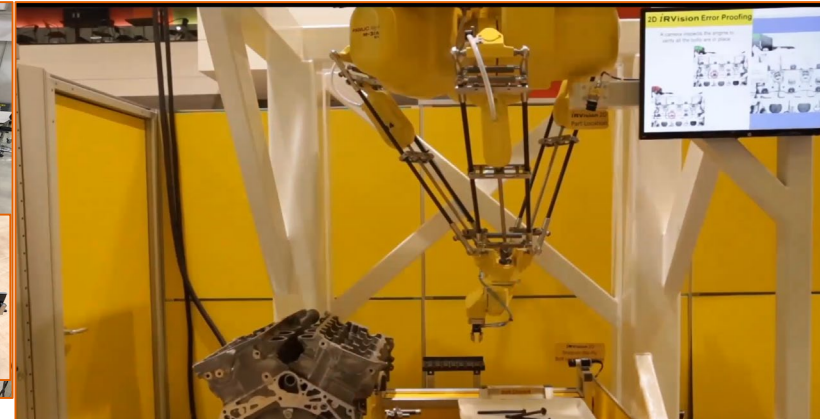
Diagram illustrating the human respiratory system (lungs) and a jet nebulizer. A red arrow points from the nebulizer towards the lungs, indicating the delivery of medication. Text boxes provide statistics: "9 million deaths annually world wide" and "Billions of dollars in cost annually to the U.S." Labels for the nebulizer include: Mouthpiece with baffle, Green Insert, and Liquid Reservoir.

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## Electronics Mfg.



## Robotics

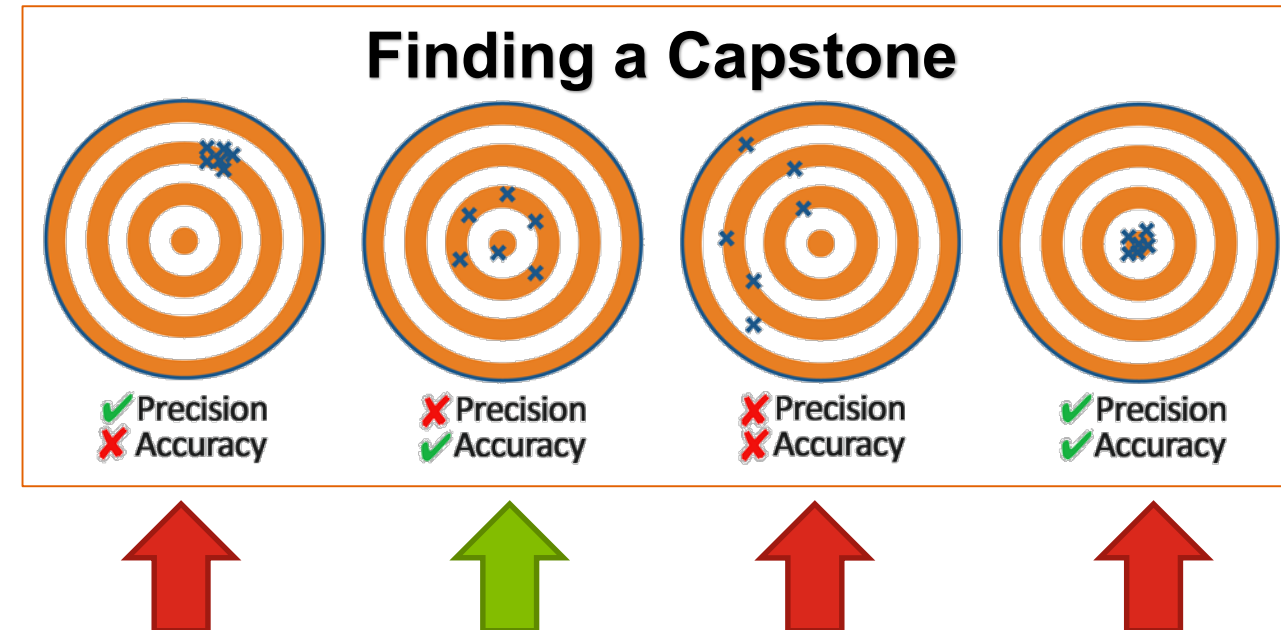


- **Dr. Anselm – Electronics Manufacturing**
- **Dr. Beck – Quality**
- **Dr. Kim – 3D printing**
- **Dr. Lewis – Polymers**
- **Dr. Olles – Advanced Mechanics**
- **Dr. O’Neil – Fluid Dynamics**
- **Dr. Phillips – Product Design**
- **Dr. Raisanen – Robotics & Automation**
- **Dr. Rice – Advanced Mechanics**
- **Prof. Share – Product Design**
- **Prof. Slifka – Robotics & Automation**
- **Dr. Villasmil – Fluid Dynamics**
- **Professor Cyr (KGCOE) – Lean Six Sigma**
- **Dr. Day (KGCOE) – BioMed Engineering**
- **Dr. Liu (KGCOE): Theoretical, computational and experimental studies of milling and hobbing**
- **Dr. Li (ECTET) – Robotics and AI**
- **Dr. Parody (COS) – Quality**
- **Professor Sevenler (KGCOE) – Product Lifecycle Management**

# Effort

## ■ Co-op or Course Project vs. Research

- Level of effort
- Depth of engineering or science knowledge and use in research topic
- No clear answer or result
- Length of literature review
  - Tangential literature



# Admissions & Exit Requirements



- Complete a [graduate application](#).
- Hold a baccalaureate degree (or equivalent) from an accredited university or college in the field of engineering, engineering technology, or computing. Students with degrees in other disciplines will be considered on an individual basis.
- Submit official transcripts (in English) of all previously completed undergraduate and graduate course work.
- Have a minimum cumulative GPA of 3.0 (or equivalent). Applicants with a lower GPA will be evaluated on a case-by-case basis and may be admitted on a probationary basis. These students will have to secure a B or better average in the first three graduate courses to be considered for full admission.
- Submit a one-page personal statement of educational objectives.
- Submit a current resume or curriculum vitae.
- Submit two letters of recommendation from academic or professional sources.
- International applicants whose native language is not English must submit scores from the TOEFL, IELTS, or PTE. A minimum TOEFL score of 80 (internet-based) is required. A minimum IELTS score of 6.5 is required. The English language test score requirement is waived for native speakers of English or for those submitting transcripts from degrees earned at American institutions.

# Exit Requirements

- **Thesis or Capstone** (Comprehensive exam option)
- **Probation & Suspension**
  - GPA  $>3.0$  after 9 credit hours or subsequently will be placed on probation
    - Must raise their Program Cumulative GPA to the 3.0 level within 9 credit hours or risk suspension from the program.
    - B or better needed in all classes
      - > Poor grades **are not replaced**; classes that are retaken have both graded included in the GPA

# Timeline

# Research Objectives

- 1. Find an Advisor**
- 2. Plan a “Research Proposal Meeting” with a committee**
  - a. Committee consists of: Advisor, Grad Director and 1 other external reviewer
- 3. Perform Research**
- 4. Write Capstone or Thesis Report**
- 5. Oral Defense of Capstone or Thesis with Committee**

# MMSI Timeline

Scheduling meetings for presentations to your committee can be done with the help of MMET office staff.

Maintain 3.0 GPA in graduate classes!

	Term	Task 1	Task 2	Task 3!
Getting Started	1	Pick a Concentration	Contact Director & Advisor	Get to know Professors
Making Progress	2	Select Advisor & Committee	Submit plan of study	Present Proposal
Nearing Completion	3	Research! Write	Research! Write	Research! Write
Graduating	4	Present Final Presentation no later than week 12!	Receive committee feedback and make corrections	Clear all holds and incomplete grades and celebrate!

*Selecting an Advisor includes registering for Capstone or Thesis courses in their section!!!*

## *Checklist of Activity*

### **Getting Started (During your first term)**

- Contact the Director of Graduate Studies & Research concerning plan of study
- Complete course work
- Register for next term

### **Making Progress (During your second term)**

- Submit completed Plan of Study to Research Director for approval
- Schedule regular status reviews of your work with capstone faculty advisor
- Review/revise plan of action with capstone faculty advisor
- Register for courses based on plan of study
- Select your faculty advisor
- Select advisory committee
- Develop Capstone Proposal and review with advisor (by week 10)
- Schedule presentation of proposal with MMET office
- Present Proposal to Committee (by week 12)
- Receive Committee Feedback and address as required
- Submit signed Capstone Plan Approval Form and all attachments to Research Director

### **Nearing Completion (one term before you graduate)**

- Write capstone report and publication
- Revise and re-review (may require multiple iterations)
- Register for courses based on plan of study

### **Graduating (the term you plan to graduate)**

- Register for final classes as required
- Clear all incomplete grades
- Clear all holds
- Submit plan to graduate to Graduate Director
- Schedule presentation of capstone project with MMET office (No later than week 12)
- Complete your capstone presentation
- Receive Committee Feedback and address as required
- Submit completed and approved copy of capstone report to Research Director (electronic and paper)
- Celebrate, and join RIT Alumni Association

- **INFORM YOUR ADVISOR – Delay Co-op until after research is complete or risk delaying graduation!!!**
  - This includes informing them when you're interviewing!
    - **You MUST have the approval of your capstone/thesis advisor prior to agreeing to the co-op assignment!!!!**
  - Not an option until you have completed 2 semesters of coursework
  - Eligible for Co-op work, it is not required as part of the MS in MMET program.
  - Must secure own Co-op assignment.
  - If you decide to complete a co-op assignment
    - International students:
      - > RIT's office of International Students Services and the MMET Graduate Director must approve Co-op assignments
      - > the cumulative total must not exceed 364 days in duration
    - Co-op evaluations must be completed by both the employer and student.

***It is important to note that accepting a job offer, verbally or in writing, constitutes a binding contract, which may not be rescinded.***



# Questions?

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