

# Aerospace Engineering Graduate Student Welcome

Daniel J. Bodony  
Aerospace Engineering

August 20, 2021

# Welcome!



Daniel  
Bodony



Jenna  
Russell



Jason  
Merret

---

MS and PhD

MEng



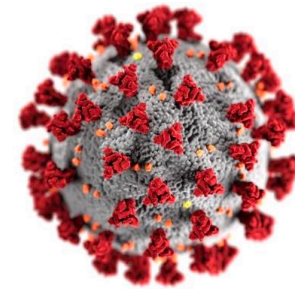
# Welcome!

- We are glad you joined our program.
- Today's purpose:
  - Introduce you to the people and structure of the graduate program
  - Introduce you to each other
  - Provide you with resources when you need help
  - Answer as many questions as we can!



# Opening Thoughts

- This academic year continues to be during a pandemic.
  - Please take seriously our collective safety
  - If we support each other, we will thrive
  - Please, please, please: contact me, Jenna or Jason if you ever need anything
- Remember that we are a diverse group from a wide variety of backgrounds. We trust that you will respect that diversity in all its forms.



# Agenda

<b>10:30–11:15 am</b>	<b>Graduate Program Overview</b>		<b>12:00–12:15 pm</b>	<b>GSAC</b>
	Professor Daniel Bodony <i>Associate Head and Dir. Of Grad. Programs</i> Jenna Russell <i>Coordinator of Graduate Programs</i>			Mr. Jacob Eisen <i>GSAC Vice President and AE MS Student</i>
<b>11:15–11:30 am</b>	<b>Welcome to AE</b>		<b>12:15–1:00 pm</b>	<b>Questions &amp; Answers</b>
	Professor Jonathan Freund <i>Department Head</i>			All, led by Professor Bodony
<b>11:30–11:45 am</b>	<b>Master of Engineering in Aerospace Systems Eng.</b>		<b>Please join us for light drinks and snacks outside, immediately following the Q&amp;A session.</b>	
	Professor Jason Merret <i>Program Director</i>			
<b>11:45–12:00 pm</b>	<b>Office of the Dean of Students</b>			
	Katherine Snyder <i>Associate Dean of Students</i>			



# 2019 was AE's 75<sup>th</sup> Birthday

- Department founded in 1944 by H. S. Stillwell
- Originally:
  - Aeronautical Eng. Option in ME
  - Then: Aeronautical & Astronautical Eng.
- Stillwell was Dept. Head from 1944 → 1976
- Now: Aerospace Engineering (2003)
- Professor Jonathan Freund is 10<sup>th</sup> Head





# AE Faculty

## Aerodynamics, fluid mechanics, combustion, and propulsion



Phil  
Ansell



Daniel  
Bodony



Greg  
Elliott



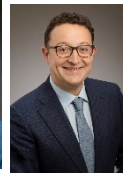
Jonathan  
Freund



Andres  
Goza



Debbie  
Levin



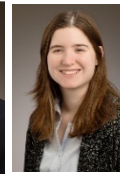
Francesco  
Panerai



Marco  
Panesi



Josh  
Rovey



Tess  
Saxton-Fox



Laura  
Villafane  
Roca



Brian  
Woodard

## Controls and dynamical systems



Cedric  
Langbort



Melkior  
Ornik



Negar  
Mehr

## Space systems



Tim  
Bretl



Zach  
Putnam



Robyn  
Woollands

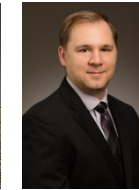


Siegfried  
Eggel

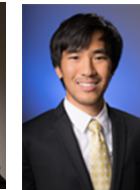
## Aerospace systems engineering



Michael  
Lembeck



Jason  
Merret



Huy  
Tran

## Aerospace structures and materials



Ioannis  
Chasiotis



Huck Beng  
Chew



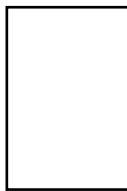
Philippe  
Geubelle



Kai  
James



John  
Lambros



Coming  
Soon

## Active Emeriti



Larry  
Bergman



Bruce  
Conway



Craig  
Dutton



Harry  
Hilton



John  
Prussing



Michael  
Selig

Key:

Full

Associate

Assistant

Specialized



Grainger College  
of Engineering

UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

Aerospace Engineering  
*Elevating Ideas Since 1944*

# Groups within AE

- Aerodynamics, Fluid Mechanics, Combustion & Propulsion (**AFMCP**)
  - Structural Mechanics and Materials (**SMM**)
  - Controls and Dynamical Systems (**CDS**)
  - Space Systems (**SS**)
- Each group
    - Coordinates teaching of classes aligned with their area
    - Coordinates and administers qualifying exams



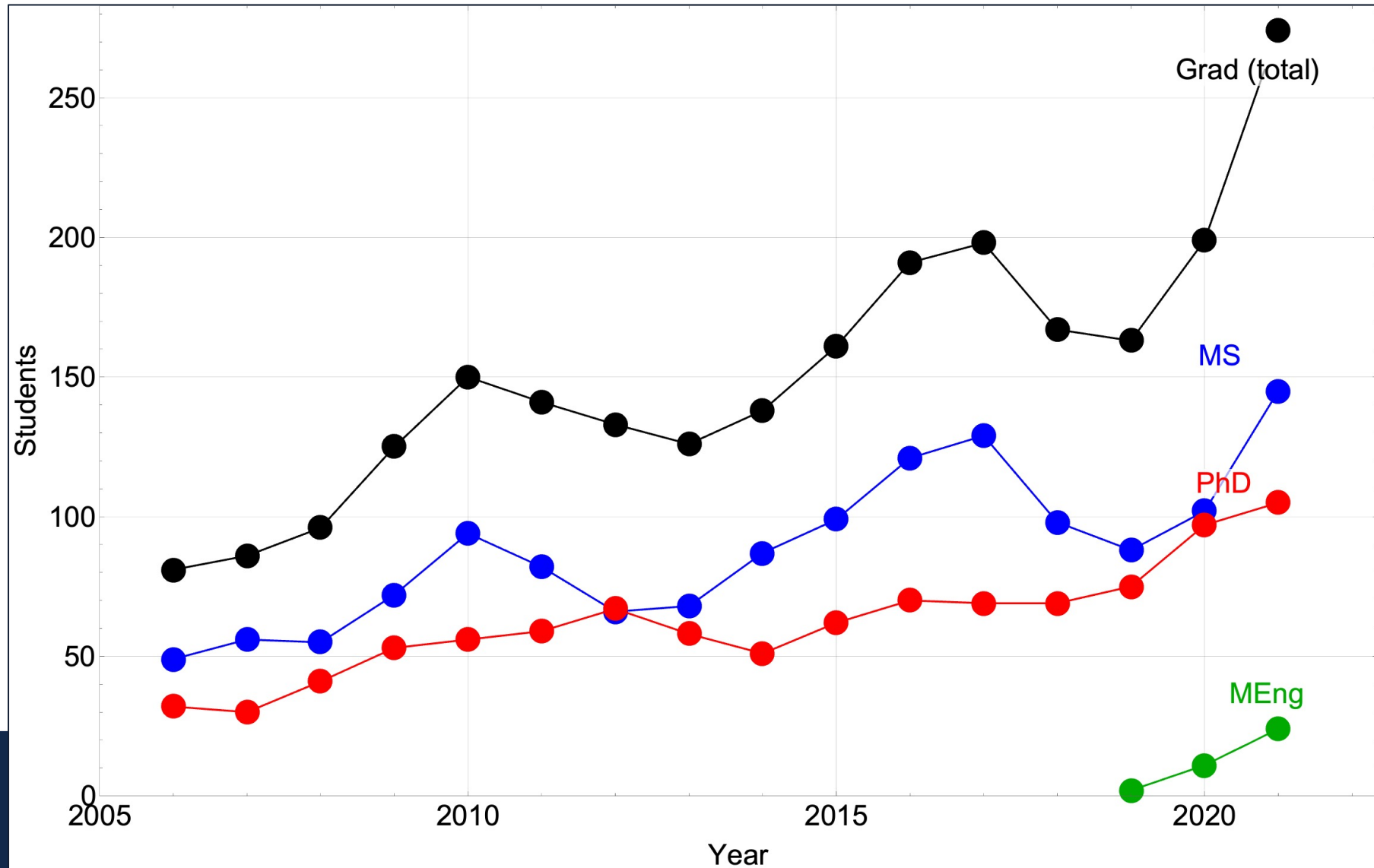


# AE Degrees and Certificates

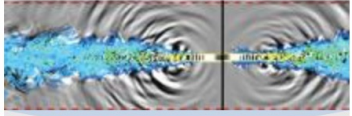
- Master of Engineering (MEng)
  - Aerospace Systems
  - Started Spring 2020
- Masters of Science (MS)
  - Non-thesis (MSNT)
  - Thesis
- PhD (including direct)
- Certificates (non-transcriptible)
  - Aerodynamics and Flight Mechanics
  - Aerospace Materials
  - Aerospace Structural Mechanics
  - Spaceflight Engineering
  - Aerospace Design and Systems Engineering
  - Hypersonics



# Enrollment Numbers



# Current AE Research Areas



AEROACOUSTICS



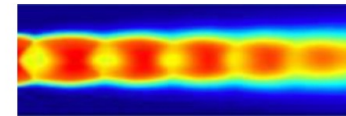
AEROELASTICITY



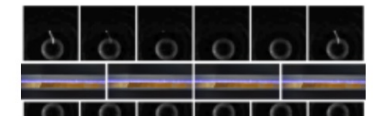
AEROSPACE  
MATERIALS



CONTROLS,  
DYNAMICAL SYSTEMS  
AND ESTIMATION



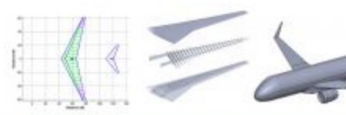
EXPERIMENTAL FLUID  
MECHANICS



FLOW CONTROL



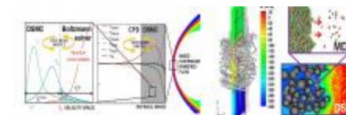
AEROSPACE  
STRUCTURES



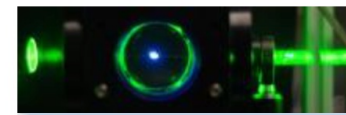
AEROSPACE SYSTEMS  
DESIGN AND  
SIMULATION



APPLIED  
AERODYNAMICS



HYPERSONICS



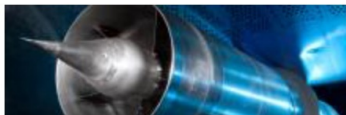
LASER AND OPTICAL  
DIAGNOSTICS



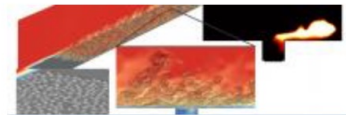
NANOSATELLITES



ASTRODYNAMICS



COMBUSTION AND  
PROPULSION



COMPUTATIONAL  
FLUID DYNAMICS



SPACE SYSTEMS



UNMANNED AERIAL  
VEHICLES



See <https://aerospace.illinois.edu/research/research-areas> for more information

# AE Program Requirements

Requirement	MSNT	MS (must have advisor)	PhD (beyond MS)
Total coursework	32 hrs ( $\leq$ 4 hrs AE 597)	24 hrs (0 hrs AE 597)	24 hrs ( $\leq$ 4 hrs AE 597)
500-level coursework	12 hrs	12 hrs	16 hrs
500-level AE coursework	8 hrs	8 hrs ( $\leq$ 4 hrs AE 599)	8 hrs
Math coursework	1 course	1 course	4 hrs
Breadth coursework	3 courses	2 courses	
AE coursework (400-level or above)	16 hrs	16 hrs ( $\leq$ 8 hrs AE 599)	
AE 590 seminar	Enrolled all semesters, 10 seminars each semester	Enrolled all semesters, 10 seminars each semester	Each semester until you have completed four semesters after passing the qualifying exam.
Thesis credit		8 hrs	40 hrs
TA requirement			1 semester



# Additional Requirements for PhD

- Qualifying exam (quals)
  - To be taken within two semesters of entering the Ph.D. program
  - Offered twice a year (January and August)
  - 3-hour written and/or oral exam in one of the groups (SMM, AFMCP, CDS & SS)
- Preliminary exam (prelim)
  - Taken at least 9 months before Ph.D. thesis defense
  - Primarily a PhD thesis proposal to thesis committee, includes document and presentation
- Ph.D. thesis defense



# MSNT/MS Looking for Funding → MS?

- Students wishing to switch to the MS thesis program **must**:
  - Find an advisor who is willing to perform research with you
  - Find an advisor who is willing to financially support you (or you agree to self-fund)
  - Have a GPA  $\gtrsim$  3.5
- Tips:
  - Be persistent, patient and polite
  - Suggest independent study (AE 597)
  - Be flexible on research topic
- Once you have an advisor, you must file a petition with the Graduate Policy Committee (see Jenna Russell)

**I** Note: faculty must spend ~\$100,000/year to support you.



**Any Questions So Far?**

**I** ILLINOIS



# Maintaining Academic Standing

- You must maintain a **3.0 GPA** (cumulative or semester) throughout your graduate program.
- If you fall below a **3.0 GPA** (cumulative or semester) you will be put on academic probation for one semester
- If you do not raise your GPA above 3.0 after probation, you will be dismissed from the program
- Suggested course load (check with your advisor):
  - 3 4-hr courses for students not doing research
  - 2 4-hr Courses plus AE 599 for students conducting research



# Ethics

- Ethics in your **research**
  - Your ethical behavior in research reflects not only on you, but also on your advisor's research group and the department
  - Ethical violations will likely end your career as a researcher
- Remember: Bad real data/results are **always** better than good made-up data/results
- Ethics in **teaching**
  - Your ethical behavior as TA reflects on the department
  - Be a positive role model for undergraduate students
- Ethics in **classes**
  - Unethical behavior as a student may (will) lead to dismissal from the university
  - All students MUST take a university mandated course (CITI) within 2 weeks of their enrollment. Also all students on payroll (RAs, TAs, hourly, etc.) must complete a state mandated ethics training course annually. **Details to follow from Jenna Russell. Check your email.**
  - All students working in a laboratory environment need to take MSE492



# Advising and Course Selection

All graduate students should have an academic advisor to help with course selection, with various requirements, ...

- If MS or PhD student: your academic advisor is your research advisor if s/he has an AE faculty appointment or is an AE faculty affiliate
- If MSNT: meet with J. Lambros (online), J. Rovey (on-campus) and J. Russell at the beginning of each semester to discuss curriculum completion plans – **Email completed degree checklist to Jenna at [jennar@illinois.edu](mailto:jennar@illinois.edu) prior to advising meeting**
- All courses should be graded, technical and generally 4 hours
- Use “suggested program tracks” put together by the AE faculty. Important note: this list is only a suggestion.



# Course Selection

## **AE 502 Advanced Orbital Mechanics credit: 4 Hours.**

Circular-restricted three-body problem; surfaces of zero velocity, libration points, and halo orbits; perturbed two-body motion; Gauss and Lagrange planetary equations, Hamilton's principle, canonical equations and Delaunay variables; application to artificial Earth satellites; orbit determination. Prerequisite: [AE 402](#).

Links to course details on Course Explorer

Prerequisites are encouraged but not enforced

## **AE 504 Optimal Aerospace Systems credit: 4 Hours.**

Formulation of parameter and functional optimization problems for dynamic systems; applications of optimization principles to the control and performance of aerospace vehicles, including optimal flight paths, trajectories, and feedback control.

Prerequisite: [AE 352](#).

## **AE 508 Optimal Space Trajectories credit: 4 Hours.**

Optimal rocket trajectories in inverse-square and linearized gravitational fields; orbital transfer, intercept, and rendezvous; high-thrust (impulsive) and low-thrust (continuous) trajectories; primer vector theory and applications; cooperative rendezvous. Prerequisite: Credit or concurrent registration in [AE 504](#).

## **AE 510 Advanced Gas Dynamics credit: 4 Hours.**

Same as [ME 510](#). See [ME 510](#).



Visit <http://catalog.illinois.edu/courses-of-instruction/ae/>

# AE 590 / 597 / 598 / 599

- AE 590 — seminar series you are required to take
- AE 597 — independent research with a faculty member that counts as course credit
- AE 598 — special topics courses (next slide)
- AE 599 — thesis credit



# Special Topic Courses (498/598)

- AE 498 (UG and G) and AE 598 (G only) are special topics courses, often new courses on research-oriented topics
- They are taught on an instructor-based schedule

Detail	Status	☆	CRN	Type	Section	Time	Day	Location	Instructor
▼	●	☆	72135	Lecture-Discussion	CIF	10:00AM - 11:20AM	TR	410C1 Engineering Hall	Goza, A
Availability	Open								
Credit	4 hours								
SectionTitle	CFD for Incompressible Flow								
Date Range	Meets 08/26/19-12/11/19								
Part of Term	1								
Section Info	This course will focus on finite volume methods for incompressible flows. The key topics of the course will be i) spatial discretization of the governing equations (which will include ideas such as the staggered-grid formulation, the adherence of discrete operators to discrete conservation laws, and the mimetic nature of certain operators), ii) time stepping applied within the differential-algebraic framework that characterizes the incompressible Navier-Stokes equations (which will include fractional-step approaches and their representation as a projection procedure), and iii) treatment of boundary conditions in 2D. Time permitting, these ideas will be combined within an immersed boundary setting to enable treatment of immersed bodies.								

Example: register for AE 598 CIF



# Summary

- Once again: welcome!
- Make the most of your graduate studies: this will likely be the best time of your life!
- Get to know your colleagues and your professors
- Work hard (but within limits): it is not a 9 to 5 job!
- Take advantage of what the University has to offer (sports, cultural activities, clubs, ...)
- If you have any questions
  - Your advisor
  - Jenna and me





# Contact Information

Daniel J. Bodony  
Blue Waters Professor  
Department of Aerospace Engineering  
Department of Mechanical Science and Engineering (by courtesy)  
306C Talbot Labs  
104 S. Wright St.  
Urbana, IL 61801  
T: (217) 244-3844  
bodony@illinois.edu  
<http://acoustics.ae.illinois.edu>



# Frequently Asked Questions

**I** ILLINOIS



## ***The Engineering IT Help Desk can help you:***



- Troubleshoot problems
- Install and license software
- Get connected to the network
- Get connected to printers
- With basic hardware and software support
- Do more! Just ask us!

**Walk-In Support  
Available at \*three\*  
Convenient Locations**

- 264 Coordinated Science Lab (CSL)
- ~~1005 Mechanical Engineering Lab (MEL)~~
- 264 Materials Research Lab (MRL)
- 2302 Siebel Center



ENGINEERING IT  
SHARED SERVICES

# ENGINEERING IT

[it.engineering.illinois.edu](http://it.engineering.illinois.edu)

[engrit-help@illinois.edu](mailto:engrit-help@illinois.edu) | 217-333-1313

**REMOTE SUPPORT**

**EMAIL & PHONE**

**WEEKDAYS**

**9 A.M. - 12 P.M. & 1 P.M. - 5 P.M.**



# What are the Direct PhD details?

- Allows students (B.S. degree GPA of 3.75) to be admitted directly into the PhD program without an MS degree
- Course requirements are the same for a combined MS and PhD, but only one dissertation is written
- Students must have the support of a faculty research advisor
- Students currently in the MS program may petition to join the Direct PhD program



# Funding Opportunities

- Announcements for fellowship opportunities are usually sent to graduate students via email. You should visit the [Fellowship Office website](#) to learn about other opportunities. Includes a searchable database.
- Teaching assistantships (TA) assigned by individual groups and by Associate Head. **Note:** AE does not offer TAs to MS non-thesis students
  - 50% appointment: 20 hrs/week
  - 25% appointment: 10 hrs/week
- Research assistantships (RA) offered by individual faculty members based on successful research grant proposals





# Is Seminar Attendance Required?

- Yes. All MS degree students are required to register for AE 590 every semester in residence and attend 10 seminars. **There will be no make-up seminars allowed.**
- Special arrangements can be made in case of class conflict (see seminar policy below).
- All PhD students must register for AE 590 until they have completed four semesters after passing the qualifying exam.
- The AE 590 seminar policy can be found at: <http://aerospace.illinois.edu/graduate-programs/course-offerings>.



# How Do I Find a Faculty Research Advisor?

- Email faculty members that you are interested in their research and inquire if they have openings
  - Include your resume
  - Indicate if you have external support (i.e. fellowship or TA)
  - This will be more successful later in the semester
- Talk to your instructors in class
- Ask if faculty will advise you for an independent study project (AE 597)
- It is OK to be persistent



# Are non-AE Advisors OK?

- Yes
  - Note: AE faculty includes department affiliates
- However, all students must have an AE co-advisor to help with AE academic requirements (coursework, qualifying exams, etc.)



# May I Take Grad. Courses Pass/Fail?

- No. Only graded coursework will count toward a graduate degree in the Department of Aerospace Engineering.
- Note: all courses for MS and Ph.D. must be technical *graded* graduate level courses. If in doubt, please contact the graduate office.



# How Do I Transfer Courses?

- Petition filled in by student and signed by advisor after completing 8 hours of graduate coursework at UIUC
- Up to 12 hours of credit may be transferred
- Transferred credit must not have been previously applied toward another degree.
- Credit can only be transferred to count towards the Master's degree.



# What Are the TA Requirements?

- VERY IMPORTANT: To receive and hold an assistantship, a student must be in good standing. If you are on academic probation (i.e., if your GPA is less than 3.0), you are not allowed to receive any assistantship (TA or RA).
- Recall: AE Department does not generally offer TAs to students without an advisor
- Mandatory training workshop for all TAs organized twice a year by the Center for Teaching Excellence (CTE)
- NOTE: International students must receive a 24 on the TOEFL iBT speaking sub-section or pass the English Proficiency Interview which is given by the University. No exceptions.
- TAs in laboratory courses must take MSE492: Lab Safety Fundamentals



# May I Take an AE 597 with My Advisor?

- MS students: no credit for independent study course (AE597)
- MSNT students: up to 4 hours of AE597 with any AE faculty member
- PhD students should not register for independent study with their research advisor, unless the project is *very different from the thesis work*. Departmental approval is required by petition.

