



**TALENT**

**TRAINING IN ADVANCED LOW  
ENERGY NUCLEAR THEORY**



# SCIENTIFIC CHALLENGES FOR LOW-ENERGY NUCLEAR THEORY

- **FACILITIES LIKE FRIB, RIKEN, GSI, ETC WHICH ADDRESS THE PHYSICS OF RADIOACTIVE ION BEAMS CAN OFFER UNPRECEDENTED DATA ON WEAKLY BOUND SYSTEMS AND THE STABILITY OF MATTER.**
- **CRUCIAL FOR NUCLEAR PHYSICS IN THE COMING YEARS: UNDERSTAND THE LIMITS OF STABILITY OF MATTER.**
- **IDENTIFY AND INVESTIGATE METHODS THAT WILL EXTEND TO UNSTABLE SYSTEMS**
- **WANT AN 'AB INITIO' AND REDUCTIONIST APPROACH STARTING WITH A NUCLEAR HAMILTONIAN CONSTRAINED FROM EFFECTIVE FIELD THEORY AND QCD.**
- **WE SEE NOW A POSSIBLE MERGING OF EFFECTIVE FIELD THEORIES WITH AB INITIO MANY-BODY METHODS, GREAT PROMISE FOR A TRULY QUANTITATIVE DESCRIPTION OF NUCLEI.**
- **WANT TO MARRY MANY-BODY CALCULATIONS WITH REACTION THEORY.**

# **A STRONG EDUCATIONAL PLATFORM IS NEEDED TO BUILD SUCH RESEARCH PROGRAMS**

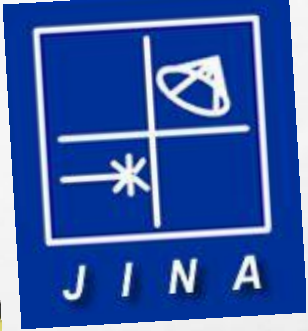
- **A STRONG EDUCATIONAL PLATFORM IS CRUCIAL FOR THE DEVELOPMENT OF A PROPER RESEARCH PROGRAM IN NUCLEAR PHYSICS. AN EXCELLENT EDUCATIONAL PROGRAM WILL ALWAYS ATTRACT GOOD STUDENTS.**
- **WE SHOULD AIM AT INTEGRATING AND EXTENDING THE NUCLEAR TALENT INITIATIVE AS AN IMPORTANT PART OF THE WAY WE EDUCATE THE NEXT GENERATION OF NUCLEAR SCIENTIST.**
- **AND DEVELOP A MODERN NUCLEAR PHYSICS CURRICULUM WITH A STRONG COMPUTATIONAL AXIS WHICH INTEGRATES WITH THE RESEARCH PROGRAMS.**

# MAIN VISIONS AND OBJECTIVES

- **TALENT AIMS AT PROVIDING ADVANCED AND COMPREHENSIVE TRAINING TO GRADUATE STUDENTS AND YOUNG RESEARCHERS IN LOW-ENERGY NUCLEAR THEORY.**
- **TALENT WILL DEVELOP A BROAD CURRICULUM THAT WILL BE THE FOUNDATION FOR CUTTING-EDGE THEORY FOR UNDERSTANDING NUCLEI AND NUCLEAR REACTIONS.**
- **THESE OBJECTIVES WILL BE MET BY OFFERING A SERIES OF LECTURES, COMMISSIONED FROM EXPERT TEACHERS IN NUCLEAR THEORY.**

# STRENGTHS AND OPPORTUNITIES

- **THE EDUCATIONAL MATERIAL GENERATED UNDER THIS PROGRAM WILL BE COLLECTED IN THE FORM OF WEB-BASED COURSES, TEXTBOOKS, AND A VARIETY OF MODERN EDUCATIONAL RESOURCES.**
- **ITS DEVELOPMENT WILL ALLOW DISPERSED UNIVERSITY GROUPS TO PROFIT FROM THE BEST EXPERTISE AVAILABLE.**
- **NO SUCH UP-TO-DATE AND ALL-ENCOMPASSING MATERIAL IS AVAILABLE AT PRESENT AND IT IS NOT FEASIBLE TO DEVELOP AND OFFER SUCH COURSES AT INDIVIDUAL INSTITUTIONS.**
- **THERE IS A SUBSTANTIAL ENTHUSIASM AND SUPPORT FROM OUR COMMUNITY.**
  - **THIS NEEDS TO BE EXPLOITED!!**



# WELCOME TO TALENT COURSE 7:

## NUCLEAR THEORY FOR ASTROPHYSICS



MICHIGAN STATE UNIVERSITY



# LOCAL ORGANIZERS

- **RICHARD CYBURT** (CYBURT@NSCL.MSU.EDU)
- **MORTEN HJORTH-JENSEN** (MORTEN.HJORTH-JENSEN@FYS.UIO.NO)
- **LINNA LESLIE** (LESLIEL@FRIB.MSU.EDU)
- **HENDRIK SCHATZ** (SCHATZ@NSCL.MSU.EDU)

# FIRST WEEK

	26-May	27-May	28-May	29-May	30-May		
Time	Monday	Tuesday	Wednesday	Thursday	Friday		
8:00 AM			Welcome				
8:30 AM	Memorial Day	Arrival	Brian 1	Brian 2	Brian 3		
9:00 AM							
9:30 AM							
10:00 AM			Coffee	Coffee	Coffee		
10:30 AM							
11:00 AM							
11:30 AM							
12:00 PM							
12:30 PM							
1:00 PM					Lunch	Lunch	Lunch
1:30 PM							
2:00 PM					Individual Network Exercises	Individual Hydro Exercises	Individual Hydro/Net Exercises
2:30 PM							
3:00 PM							
3:30 PM			Coffee	Coffee	Coffee		
4:00 PM							
4:30 PM			Individual Network Exercises	Individual Hydro Exercises	Group Assignment/ Pre-game		
5:00 PM							
5:30 PM							
6:00 PM							
6:30 PM							
7:00 PM							
7:30 PM							
8:00 PM			Reception Dinner @ Beggar's Banquet		Lansing Lugnuts (Baseball) Game		
8:30 PM							
9:00 PM							
9:30 PM							



# SECOND WEEK

	2-Jun	3-Jun	4-Jun	5-Jun	6-Jun	7-Jun
Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
8:00 AM						
8:30 AM						Platte River Road Trip (Canoe/Nature)
9:00 AM	Brian 5	Brian 6	Raph 5	Hendrik 1	Hendrik 3	
9:30 AM						
10:00 AM	Coffee	Coffee	Coffee	Coffee	Coffee	
10:30 AM						
11:00 AM	Raph 3	Raph 4	Raph 6	Hendrik 2	Student Summaries	
11:30 AM						
12:00 PM						
12:30 PM	Lunch	Lunch	Lunch	Lunch	Lunch	
1:00 PM						
1:30 PM						
2:00 PM						
2:30 PM	Group Exercises	Group Exercises	Group Exercises	Group Exercises	Student Summaries	
3:00 PM						
3:30 PM	Coffee	Student Talks	Student Talks	Student Talks	Coffee	
4:00 PM						
4:30 PM						
5:00 PM	Topic Ideas and Group Roles	Group Exercises	Group Exercises	Group Exercises	Group Assignment	
5:30 PM						
6:00 PM						
6:30 PM						

# THIRD WEEK

	9-Jun	10-Jun	11-Jun	12-Jun	13-Jun	14-Jun
Time	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
8:00 AM						
8:30 AM	Gail 1	Gail 2	Gail 3	George 4	Student Summaries	Departure
9:00 AM						
9:30 AM						
10:00 AM	Coffee	Coffee	Coffee	Coffee	Coffee	
10:30 AM	George 1	George 2	George 3	George 5	Student Summaries	
11:00 AM						
11:30 AM						
12:00 PM	Lunch	Lunch	Lunch	Lunch	Farewell Lunch	
12:30 PM						
1:00 PM						
1:30 PM	Exercises	Group Exercises	Group Exercises	Group Exercises	Departure	
2:00 PM						
2:30 PM						
3:00 PM	NSCL Lab tour	Student Talks	Student Talks	Student Talks	Departure	
3:30 PM						
4:00 PM	Coffee	Group Exercises	Group Exercises	Group Exercises		
4:30 PM	Topic Ideas and Group Roles					
5:00 PM						
5:30 PM						
6:00 PM						
6:30 PM						

# LECTURES

- **1 HOUR LECTURE**
- **30 MINUTE DISCUSSION GROUPS**
  - **FORM GROUPS (SHUFFLE GROUP MEMBERS THROUGHOUT DAY/WEEK)**
  - **DISCUSS TOPIC OF LECTURE**
  - **RAISE QUESTIONS OVER POINTS UNCLEAR**
  - **FILL OUT FEEDBACK QUESTIONNAIRE FOR LECTURER**
    - **THIS WILL BE USEFUL FOR ORGANIZING THE AFTERNOON SESSIONS**

# COFFEE

- MORNING COFFEE BREAKS**

- FIXED TIME**

- AFTERNOON COFFEE**

- AVAILABLE THROUGHOUT**

	26-May	27-May	28-May	29-May	30-May
Time	Monday	Tuesday	Wednesday	Thursday	Friday
8:00 AM			Preview		
8:30 AM					
9:00 AM			Brian 1	Brian 2	Brian 3
9:30 AM					
10:00 AM			Coffee	Coffee	Coffee
10:30 AM					
11:00 AM			Raph 1	Raph 2	Brian 4
11:30 AM					
12:00 PM					
12:30 PM			Lunch	Lunch	Lunch
1:00 PM	Memorial Day	Arrival			
1:30 PM					
2:00 PM			Individual Network Exercises	Individual Hydro Exercises	Individual Hydro/Net Exercises
2:30 PM					
3:00 PM					
3:30 PM			Coffee	Coffee	Coffee
4:00 PM					
4:30 PM			Individual Network Exercises	Individual Hydro Exercises	Group Assignment/ Pre-game
5:00 PM					
5:30 PM					
6:00 PM					
6:30 PM					
7:00 PM					
7:30 PM					
8:00 PM			Reception Dinner @ Beggar's Banquet		Lansing Lugnuts (Baseball) Game
8:30 PM					
9:00 PM					
9:30 PM					

# LUNCH

- **LUNCH TICKETS FOR THE GALLERY AT SNYDER/PHILLIPS HALL (CLOSES AT 1PM)**

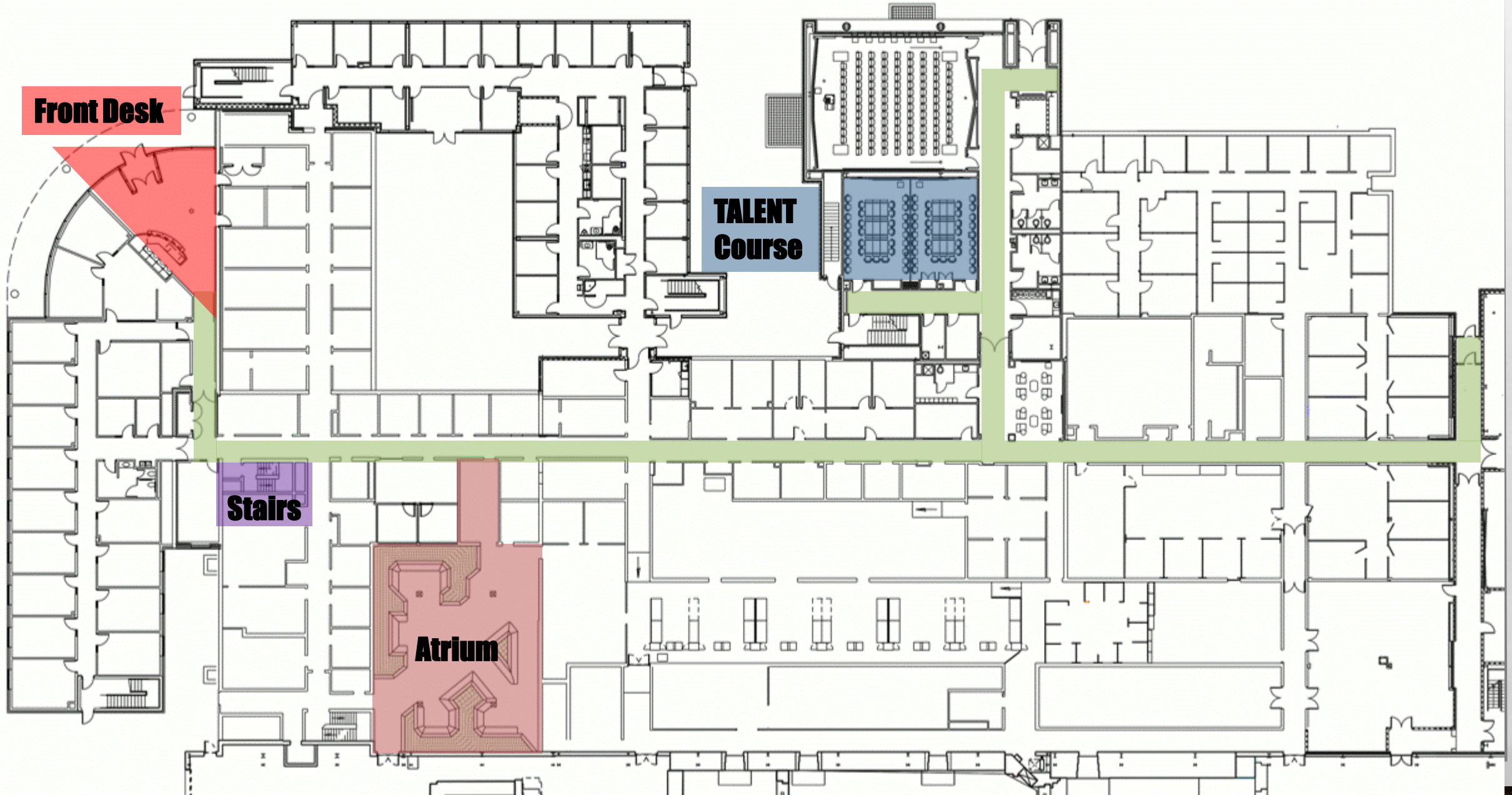
- **STUDENTS PAIRED WITH LECTURERS**
- **2 STUDENTS PER LECTURER**
- **SEE LUNCH PAIRINGS LIST**

- **TODAY AT 1:30!!!!**

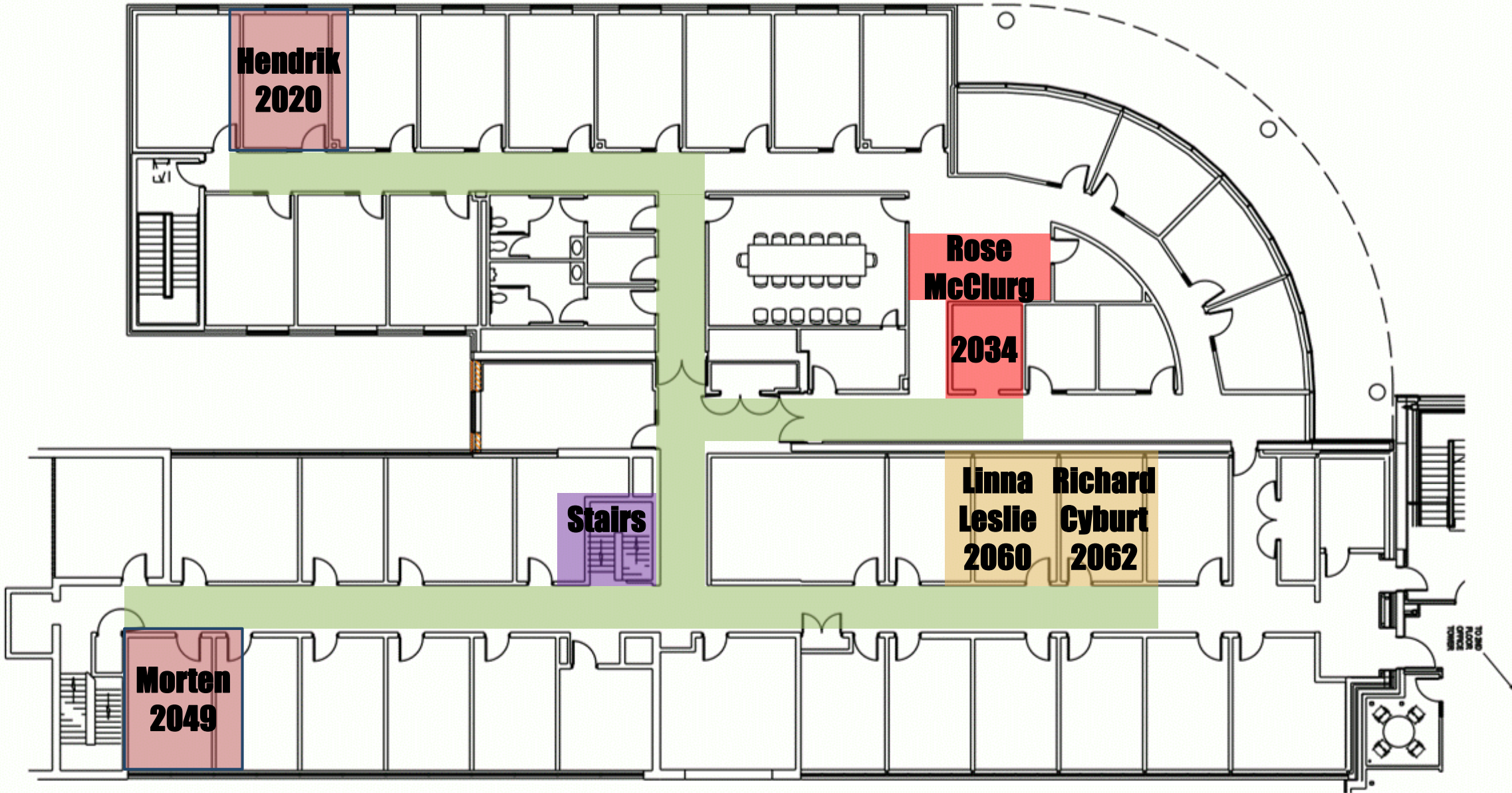
- **NEED TO VISIT ROSE MCCLURG (2034)**
- **PIC TAKEN FOR BUILDING ACCESS BADGE**

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9:00 PM					
9:30 PM					

# NSCL First Floor



# NSCL Second Floor



# PROJECTS

- **2 PROJECTS DURING THIS COURSE**

- **FRIDAY BEFORE PROJECT WEEK:**

- **GROUPS ARE FORMED**

- **FOLLOWING MONDAY:**

- **GROUPS PRESENT TOPIC IDEA**
- **LAY OUT PROJECT ROLES**

- **FRIDAY AFTER PROJECT WEEK**

- **GROUPS SUMMARIZE PROJECT RESULTS**

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10:30 AM					Student Summaries	
11:00 AM	Raph 3	Raph 4	Raph 6	Hendrik 2		
11:30 AM						
12:00 PM						
12:30 PM	Lunch	Lunch	Lunch	Lunch	Lunch	Platte River Road (Canoe/Nature) Trip
1:00 PM						
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2:00 PM						
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# STUDENT TALKS

- **YOU CAN PRESENT YOUR RESEARCH**
- **JUST LET US KNOW**
- **WILL BE HELD IN THE AFTERNOON**

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# EXCURSIONS

- **WELCOME RECEPTION**

- **AT BEGGAR'S BANQUET**
- **STARTING AT 6PM**
- **FOOD WILL BE SERVED**
- **2 DRINK TICKETS**

- **LANSING LUGNUTS**

- **CARPOOLING NEEDED!!!**
  - **IF YOU WANT TO HELP, LET US KNOW**
  - **PARKING NEAR STADIUM FOR A FEE**
- **BBQ INCLUDED**

- **PLATTE RIVER TRIP**

- **BUS MEETS @ NSCL AT 8AM**
- **BRING SHOES/CLOTHES YOU DON'T MIND GETTING WET**

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# EVERYTHING IS ON THE WIKI

- **THIS COURSE'S MATERIAL IS ON THE WIKI**
- **USE THE WIKI AS YOUR LOGBOOK**
- **YOU CAN ADD/MODIFY CONTENT ON THE WIKI**
- **ADD DISCUSSION AND QUESTIONS TO THE WIKI**
- **ADD YOUR PRESENTATIONS AND SUMMARIES TO THE WIKI**