

# TALENTTRAINING IN ADVANCED LOWENERGY NUCLEAR THEORY

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## 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 <u>'AB INITIO</u>' 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



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## LOCAL ORGANIZERS

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E. F.

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

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# **FIRST WEEK**

# **SECOND WEEK**

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	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						
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					Churchenst	
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	Platte River
1:00 PM	Editori	Lanch		Editeri	Road Trip	
1:30 PM						(Canoe/Nature)
2:00 PM					Student	
2:30 PM	Group Exercises	Group Exercises	Group Exercises	Group Exercises	Summaries	
3:00 PM						
3:30 PM	Coffee	Student Talks	Student Talks	Student Talks	Coffee	
4:00 PM	Conce		otducine runto		Conce	
4:30 PM	Tanialdaeaand				Crown	
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						

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	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						
9:00 AM	Gail 1	Gail 2	Gail 3	George 4	Student Summaries	
9:30 AM						
10:00 AM	Coffee	Coffee	Coffee	Coffee	Coffee	
10:30 AM					Chudant	
11:00 AM	George 1	George 2	George 3	George 5	Student Summaries	
11:30 AM						
12:00 PM						
12:30 PM	Lunch	Lunch	Lunch	Lunch	Farewell Lunch	Departure
1:00 PM						
1:30 PM						
2:00 PM	Exercises					
2:30 PM		Group Exercises	Group Exercises	Group Exercises		
3:00 PM	NSCL Lab tour					
3:30 PM		Student Talks	Student Talks	Student Talks	Departure	
4:00 PM	Coffee					
4:30 PM	Topic Ideas and					
5:00 PM	Group Roles	Group Exercises	Group Exercises	Group Exercises		
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

		26-May	27-May	28-May	29-May	30-May
	Time	Monday	Tuesday	Wednesday	Thursday	Friday
	8:00 AM			Preview		
OOFFFF	8:30 AM					
COFFEE	9:00 AM			Brian 1	Brian 2	Brian 3
	9:30 AM 10:00 AM			Coffee	Coffee	Coffee
MORNING COFFEE BREAKS	10:30 AM			Conee	Conee	Conee
	11:00 AM			Raph 1	Raph 2	Brian 4
FIXED TIME	11:30 AM				·	
	12:00 PM					
	12:30 PM			Lunch	Lunch	Lunch
	1:00 PM	Memorial Day	Arrival	Lunch	Editeri	Lunch
AFTERNOON COFFEE	1:30 PM					
	2:00 PM			Individual	Individual Hydro	Individual
AVAILABLE THROUGHOUT	2·30 PM			Network	Exercises	Hydro/Net
	3:00 PM			LACICISES		LACICISES
	3:30 PM 4:00 PM			Coffee	Coffee	Coffee
	4:30 PM			lo dividuo l		Crown
	5:00 PM			Network	Individual Hydro	Assignment/ Pre-
	5:30 PM			Exercises	Exercises	game
	6:00 PM					
	6:30 PM					
	7:00 PM					
	7:30 PM			Reception Dinner		
	8:00 PM			@ Beggar's		Lansing Lugnuts
	8:30 PM			Banquet		(Baseball) Game
	9:00 PM					
	9:30 PM					

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		26-May	27-May	28-May	29-May	30-May
	Time	Monday	Tuesday	Wednesday	Thursday	Friday
	8:00 AM			Preview		
LUNOU	8:30 AM					
LUNCH	9:00 AM			Brian 1	Brian 2	Brian 3
	9:30 AM 10:00 AM			Coffee	Coffee	Coffee
LUNCH TICKETS FOR THE GALLERY AT	10:30 AM			Conee	Conee	Conee
	11:00 AM			Raph 1	Raph 2	Brian 4
SNYDER/PHILLIPS HALL (CLOSES AT 1PM)	11.00 AM					
	12:00 PM					
STUDENTS PAIRED WITH LECTURERS	12:30 PM			Lunch	Lunch	Lunch
• 2 STUDENTS PER LECTURER	1:00 PM	Memorial Day	Arrival			
	1:30 PM					
SEE LUNCH PAIRINGS LIST	2:00 PM 2:30 PM			Individual Network	Individual Hydro	Individual Hydro/Net
JLL LUNUII FAIIINUJ LIJI	2:30 PM 3:00 PM			Exercises	Exercises	Exercises
TODAY AT 1:30!!!!!	3:30 PM				<b>C</b> . ((	
IVDAI AI I.UVIIII	4:00 PM			Coffee	Coffee	Coffee
• NEED TO VISIT ROSE MCCLURG (2034)	4:30 PM			Individual	Individual Hydro	Group
	5:00 PM			Network	Exercises	Assignment/ Pr
PIC TAKEN FOR BUILDING ACCESS BADGE	5:30 PM			Exercises		game
	6:00 PM					
	6:30 PM 7:00 PM					
	7:30 PM					
	8:00 PM			Reception Dinner		Lansing Lugnut
	8:30 PM			@ Beggar's Banquet		(Baseball) Gam
	9:00 PM			Banquet		
	9:30 PM					

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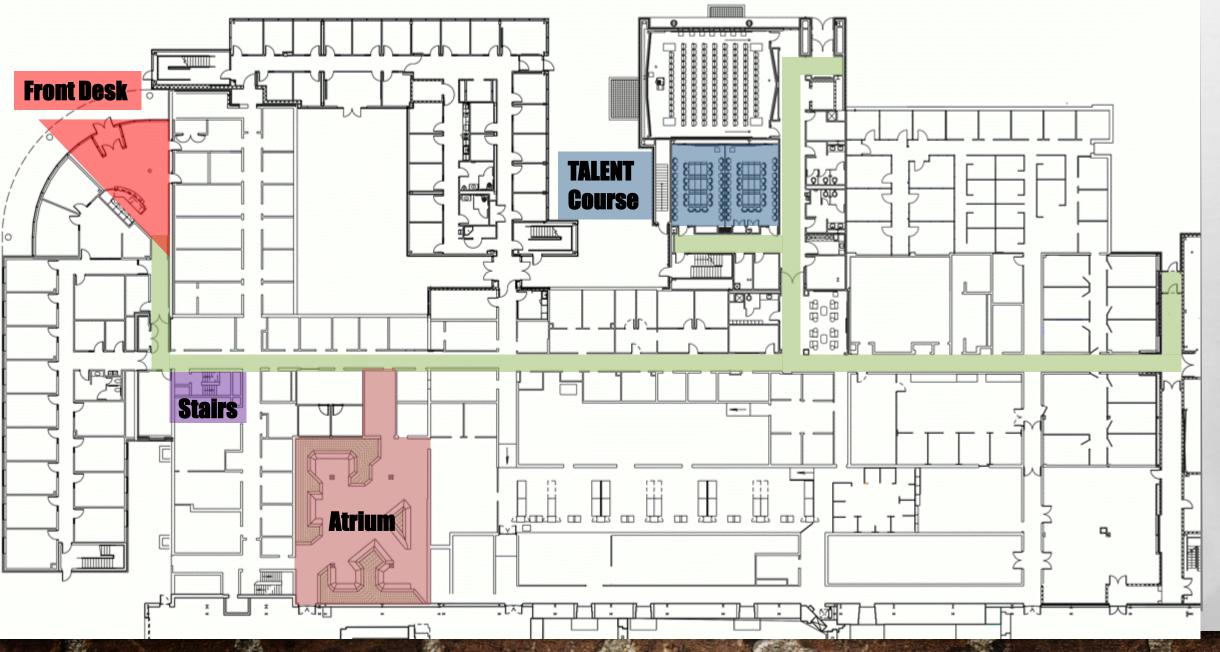
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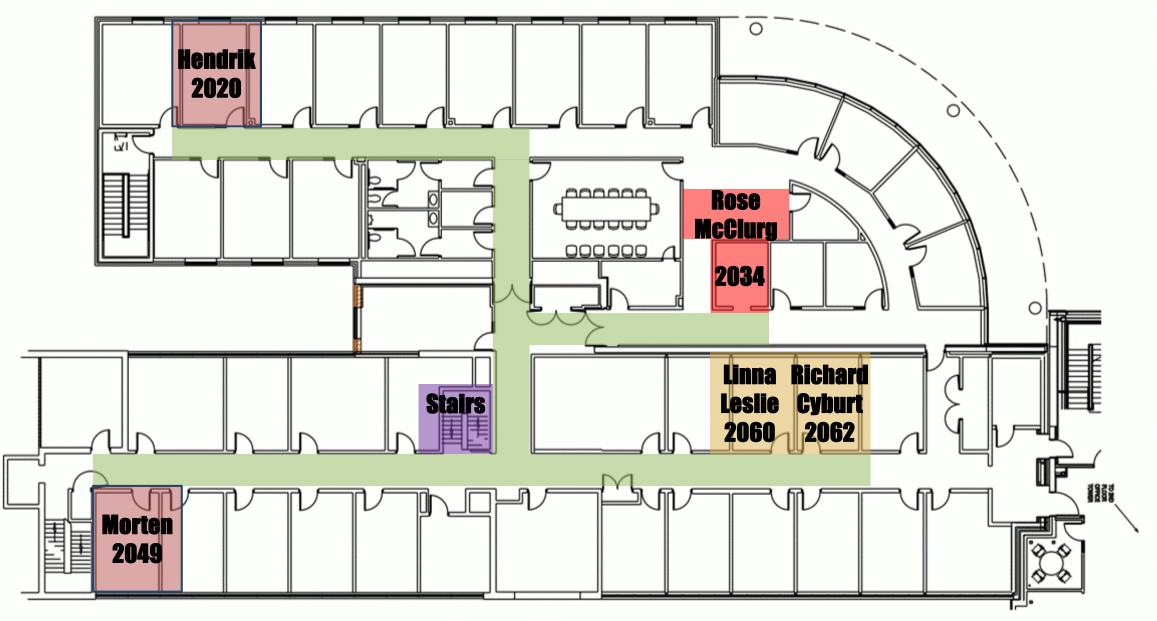
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## **NSCL First Floor**



## **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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3-Jun 5-Jun 6-Jun 7-Jun 2-Jun 4-Jun Friday Time Monday Tuesday Wednesday Thursday Saturday 8:00 AM 8:30 AM Brian 5 Brian 6 Raph 5 Hendrik 1 Hendrik 3 9:00 AM 9:30 AM Coffee Coffee 10:00 AM Coffee Coffee conee 10:30 AM Student Raph 3 Raph 4 Raph 6 Hendrik 2 11:00 AM Summaries 11:30 AM 12 00 PM Platte River 12:30 PN Lunch Lunch Lunch Lunch Lunch Road 1.00 PM (Canoe/Nature) Trip 1:30 PM 2:00 PT Student 2:30 PM Group Exercises Group Exercises Group Exercises Group Exercises Summaries 3:00 PM 3:30 PM Coffee Student 1. Ks Coffee Student Talks Student Talks 4:00 PM 4:57 PI Topic Ideas and Group Group Exercises Group Exercises Group Exercises 5:00 Pi **Group Roles** Assignment 5:30 PI 6:00 PM 6:30 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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- at 1

	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						
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					Student	
11:00 AM	Raph 3	Raph 4	Raph 6	Hendrik 2	Summaries	
11:30 AM						
12.90 PM						
12:30 F. 1	Lunch	Lunch	Lunch	Lunch	Lunch	Platte River Road
1:00 PM						(Canoe/Nature)
1:30 PM						Trip
2:00 PM					Student	
2:30 PM	Group Exercises	roup Exercises	Group Exercises	Group Exercises	Summaries	
3:00 PM						
3:30 PM	Coffee	Student Talks	Student Talks	Student Talks	Coffee	
4:00 PM						
4:30 PM	Topic Ideas and				Group	
5:00 PM	Group Roles	Group Exercises	Group Exercises	Group Exercises	Assignment	
5:30 PM						
6:00 PM						
6:30 PM						

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		26-May	27-May	28-May	29-May	30-May
	Time	Monday	Tuesday	Wednesday	Thursday	Friday
	8:00 AM			Preview		
EXCURSIONS	8:30 AM					
ENGUNJIUNJ	9:00 AM			Brian 1	Brian 2	Brian 3
	9:30 AM					
• WELCOME RECEPTION	10:00 AM			Coffee	Coffee	Coffee
<ul> <li>AT BEGGAR'S BANQUET</li> </ul>	10:30 AM			De de d		
STARTING AT 6PM	11:00 AM			Raph 1	Raph 2	Brian 4
FOOD WILL BE SERVED	11:30 AM					
	12:00 PM 12:30 PM					
• 2 DRINK TICKETS	12.30 PM	Memorial Day	Arrival	Lunch	Lunch	Lunch
LANSING LUGNUTS	1:30 PM	Wemonal Day	7.1110.11			
	2:00 PM					Individual
• <u>CARPOOLING NEEDED!!!</u>	2:30 PM			Individual Network	•	Hydro/Net
<ul> <li>IF YOU WANT TO HELP, LET US KNOW</li> </ul>	3:00 PM			Exercises	Exercises	Exercises
<ul> <li>PARKING NEAR STADIUM FOR A FEE</li> </ul>	3:30 PM					
BBQ INCLUDED	4:00 PM			Coffee	Coffee	Coffee
	4:30 PM			la di dala di Natara di		Crosse Asian and I
• PLATTE RIVER TRIP	5:00 PM			Individual Network Exercises	Individual Hydro Exercises	Group Asignment/ Pre-game
<ul> <li>BUS MEETS @ NSCL AT 8AM</li> </ul>	5:30 PM			Excroitect	LACTOIDED	The Build
BRING SHOES/CLOTHES YOU DON'T MIND GETTING	6:00 PM					
WET	6:30 PM					
	7:00 PM					
	7:30 PM			Reception Dinner		
	8:00 PM			@ Beggar's		Lansing Lugnuts
	8:30 PM			Banquet		(Baseball) Game
	9:00 PM					
	9:30 PM					

## **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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	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						
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	Platte River
1:00 PM	Editeri	Lunch	Lunch	Lunch	Eurien	Road (Canoe/Nature)
1:30 PM						Trip
2:00 PM					Charles a	
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	conce	Student raiks	Student Taiks	Student raiks	conce	
4:30 PM	<del>.</del>				<b>C</b>	
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						

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## **EVERYTHING IS ON THE WIKI**

- THIS COURSE'S MATERIAL IS ON THE WIKI
- USE THE WIKI AS YOUR LOGBOOK

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- YOU CAN ADD/MODIFY CONTENT ON THE WIKI
- ADD DISCUSSION AND QUESTIONS TO THE WIKI
- ADD YOUR PRESENTATIONS AND SUMMARIES TO THE WIKI