College Curriculum Committee, 1420 Lurie Engineering Center Building



Form Number 1356

Action Requested

New CourseModification of Existing CourseDeletion of Course

Complete the following sections: New Courses - B & C completely

Modifications - A modified information, B & C completely

Date 2/23/2004

Effective Fall 2004

	A. CURRENT LISTING		3. RE	QUESTED LIS	STING		
	Home Department Div # Course Nu. Materials Science & Engineering 281 465		ome Depa			Div #	Course Number 465
	Cross Listed Course Information	Cros	ss Listed (Course Information		,	
	Course Title		urse Title ructura	I and Chemical Cl	haracterization o	f Materials	<u> </u>
	TITLE	TI AB	ITLE BBRE- ATION	Time Sched Max = 19 Spaces Transcript Max = 20 Spaces	Struc Chem Ch	ar Matis	
	Course Description	Stu tec en sp co tec stu	udy of chniquagineer ectrosovered. chniquady a r	iption for Official Publication the basic structur es that are commo- ing. X-ray, electro copies, microscop Lectures will be in es will be demons naterial. Techniqu ng physics and ch	ral and chemical conly used in mate in and neutron di cies, and scannir ntegrated with a strated and/or use es will be preser	erials scientifraction, and probe in aboratory aboratory and by the second contractions.	nce and a wide range of nethods will be where the student to
	PROGRAM OUTCOMES: a b c d e f g h l j Degree Requirements O Degree Requirement O Tech Elective O Core Course O Free Elective	∃k ⊠	a 🛚		equirement O Tech Electrics O Other		⊠j ⊠k
Х	Prerequisites MSE 220/250, MSE 242, MSE 360, MSE 365 (concurrent) ○ Enforced ⊙ Advised	Prer	requisites	MSE 220 or 250, MSE 24 ① Enforced O Advised			
	Credit Restrictions		dit strictions	adib			
	Level of Credit ☐ Undergrad only ☐ Rackham Grad ☐ Non-Rickham Grad ☐ Ugrad or Rickham Grad ☐ Ugrad or Non-Rickham Grad ☐ Ugrad or Non-Rickham Grad ☐ Ugrad or Non-Rickham Grad		Undergrad Rackham Non-Rokh Ugrad or F	only ☐ All Cro	edit types n Grad w/add'l Work	Credit Hours Min Max 3 3	time Abile 9
C.	Repeatability (Indi Research, Dir. Study, Dissertation: Is this course repeatable? O Yes O No Maximum Hours? Maximum Times? Can it be repeated in the same term? O Yes O No	P	rinting l	nformation Solve Print the co	course in the Bulletin course in the Time Schedu	ule	
	Class Graded O Lec Grading Location	Fr	eq. of] ■ □ ia □ ib			Half term 1 1st 2nd
	☐ Rec ○ Sem ☑ A-E ☐ Sem ○ Lab ☐ CR/NC ☒ Ann Arbor ☒ Lab ○ Dis ☐ S/U ☐ Biological Statis ☐ Dks ○ Ind ☐ P/F ☐ Camp Davis ☐ Ind ○ Other ☐ Y ☐ Extension	n Cog Mer	gnizant Fa mber:		S. Yalisove I. Goldman	Title As	soc. Professor st. Professor
	Approval			Submitted By: Home De	ept. Cross-listed Dept		
[Curriculum Comm.		e, Signatu Iome De	re & Department ept. <u>John W. Hallo</u> i	ran, Dept. Chair	4 V V	
[☐ Faculty ☐ Rackham ☐ Cross listed Unit 1 ☐ Cross listed Unit 2	Cros	ss-listed C	Depti(s).			133

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MSE requests that the prerequisites for this course be changed from " advised" to "enforced,"
as now allowed by the new policy from the Registrar's Office. Furthermore, the Undergraduate
Committee of MSE recommends that the current prerequisite requirement be changed to "MSE
220 or 250, MSE 242, and MSE 360" to better reflect the background knowledge and skills
required for this course.
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Are any special resources or facilities required for this course? □ Yes ☒ No
Detail the Special requirements

College Curriculum Committee, 1420 Lurie Engineering Center Building



Form Number 1363

Action Requested

New CourseModification of Existing CourseDeletion of Course

Complete the following sections:

New Courses - B & C completely

Modifications - A modified information, B & C completely

Date 2/24/2004

Effective Fall 2004

	A. CURRENT LISTING	B. REQUESTED LISTING	
	Home Department Div # Course Number Materials Science & Engineering 281 489	Home Department Div # Course Number MATSCIE 281 489	
	Cross Listed Course Information	Cross Listed Course Information MFG 275 489	
	Course Title	Course Title Materials Processing Design	
	TITLE	TITLE	
	Max = 20 Spaces Course Description	Course Description for Official Publication (Max = 50 words) The design of production and refining systems for engineering materials. Design of problems for the extraction and refining of metals, production and processing of ceramics, polymeric materials, and electronic materials. Written and oral presentation solutions to processing design problems.	of
	PROGRAM OUTCOMES: a b c d e f g h i j k Degree Requirements O Degree Requirement O Tech Elective O Core Course O Free Elective	PROGRAM OUTCOMES: □ a □ b □ c □ d □ e □ f □ g □ h □ i □ j □ k □ Degree Requirements □ Tech Elective □ Core Course □ Orther □ O	
X	Prerequisites Preceded or accompanied by MSE 430 and MSE 435. © Enforced © Advised Credit	Prerequisites MSE 330 and MSE 335. © Entorced © Advised Credit	
	Credit Hours Contact Hrs/Wk Min Max Number Ugrad or Rockhm Grad Ugrad or Rockhm Grad Ugrad or Non-Rickhm Grad U	Restrictions Level of Credit Undergrad only All Credit types Min Max Non-Rokhm Grad Rokhm Grad Wladd'l Work Sugar Number Ugrad or Rokhm Grad Ugrad or Non-Rokhm Grad Ugrad or Non-Rokhm Grad Ugrad or Non-Rokhm Grad Ugrad or Non-Rokhm Grad	
C.	Repeatability (Indi Research, Dir. Study, Dissertation: Is this course repeatable? O Yes O No Maximum Hours? Maximum Times? Can it be repeated in the same term? O Yes O No	Printing Information State Print the course in the Bulletin (Optional) State Print the course in the Time Schedule	
	Class	Terms &	
	Approval Curriculum Comm. Faculty Rackham Cross listed Unit 1	J. Halloran Professor Grad Course: Attach nomination if Cognizant Faculty is not a regular graduate faculty Submitted By: ■ Home Dept. □ Cross-listed Dept. Name, Signature & Department Home Dept. John W. Halloran, Dept. Chair Cross-listed Dept(s).	
[Cross listed Unit 2		

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SUPPORTING STATEMENT
MSE requests that the prerequisites for this course be changed from " advised" to "enforced,"
as now allowed by the new policy from the Registrar's Office. Furthermore, the Undergraduate
Committee of MSE recommends that the current prerequisite requirement be changed to "MSE
330 and MSE 335" to better reflect the background knowledge and skills required for this
course.
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Are any special resources or facilities required for this course?
Detail the Special requirements
The students will need extensive use of laboratory and computer design facilities: including both hardware and software. Most needs will be met by CAEN and department facilities. Students may have to seek off-campus resources to solve some of their problems.

College Curriculum Committee, 1420 Lurie Engineering Center Building



Form Number 1364

Action Requested

New CourseModification of Existing CourseDeletion of Course

Complete the following sections:

New Courses - B & C completely

Modifications - A modified information, B & C completely

Deletions - A & C completely

Date 2/24/2004

Effective Fall 2004

		JRRENT LIS	IING	- · · ·	Course Number	···	EQUESTED L	JOHNU	Pile #	Course Number
	Home Depa Materials	_{tment} Science & Engines	ering	Div# 281	Course Number 493	MATSCIE			Div # 281	493
	Cross Listed	Course information				Cross Listed	Course Information			
Х	Course Title	Topics in Materi	ials Processing ar	nd Applicati	ions	Course Titte		Is Science & Engir	neering	
	TITLE	Time Sched				TITLE	Time Sched	SPEC TOPICS	IN MSE	
	ABBRE- VIATION	Max = 19 Spaces Transcript				ABBRE- VIATION	Max = 19 Spaces Transcript	SPEC TOPICS		
	Course Desc	Max = 20 Spaces				↓	Max = 20 Spaces ription for Official Publicati			
	PROG	puirements O Deg	ree Requirement O Tech E Course O Other		i □j □k	PROG □ a □	RAM OUTCO	Requirement O Tech Electourse O Other	hi	
Х	Prerequisites	44 7 7 4	Elective O end			Prerequisites	MSE 350. © Enforced © Advis	•		
	Credit Restrictions					Credit Restrictions				
	Level of Cre ☐ Undergrad ☐ Rackham ☐ Non-Rckh ☐ Ugrad or F	only □ Al Grad □ Ri m Grad	l Credit types ckhm Grad w/add'l Work	Credit Hours Min Max	Contact Hrs/Wk Number of Wks	Level of Ci Undergrad Rackham Non-Rickh SUgrad or I Ugrad or I	donly ⊡ Ail C Grad □ Rok nm Grad	Credit types hm Grad w/add'l Work	Credit Hours Min Max Arr Arr	Contact Hrs/Wk Arr Number of Wks 14
C.	Is this cours Maximu	se repeatable?	Maximum Times?			Printing 1	nformation S Print the (Optional) Print the	e course in the Bulletin e course in the Time Schedu		
		Graded Lec Section Rec Sem Lab Dis Ind	O Sem	C MA	cation nn Arbor iological Station amp Davis	Freq. of		b ■ III ■ Even Years ■ Odd Ye Staff		alf term
		Other	O Other, □ Y	□ E	xtension		Attach provinction # Co-	nizant Faculty is not a regula	Maradi iato tan ilih	, 7
	Approval							Dept. Cross-listed/Dept.	1//	
		um Comm.					re & Department	oran, Dept. Chair	1011	
] Faculty					Cross-listed [•			
_] Rackha		-10 - 000				***************************************			125
	-	sted Unit 1 sted Unit 2					***************************************			137

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MSE requests that this course title be changed to better ref	lect it's relationship to Materials
Science & Engineering in it's entirity. We also request that r	prerequisites for this course be
changed from " advised" to "enforced," as now allowed by t	he new policy from the Registrar's
Office	

	\$

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Are any special resources or facilities required for this course?	Nh
Detail the Special requirements	

Department of Naval Architecture and Marine Engineering University of Michigan February 16, 2004

MEMORANDUM

From:

Michael G. Parsons

Academic Affairs Committee Chair

Department of Naval Architecture and Marine Engineering

University of Michigan

To:

Gregory M. Hulbert

Curriculum Committee Chair

College of Engineering

University of Michigan

Subject: Approval of Program Change

The Department of Naval Architecture and Marine Engineering requests College approval of a Program Change to implement the following:

- 1. introduce a new course in Marine Systems Manufacturing (NA280, 3 credits);
- 2. replace NA277 Introduction to Probability and Statistics with Marine Applications (2 credits) with IOE/Stat265 Probability and Statistics for Engineers (4 credits);
- 3. drop the Advanced Mathematics requirement;
- 4. drop NA276, NA277, and technical elective NA460;
- 5. add an Advanced Mathematics course as one of the allowed technical electives.

Change 2 is being made to strengthen the preparation of our students in the area of probability and statistics and to reduce the course duplication within the College. Change 3 is being made to provide the hours needed for the addition of IOE/Stat 265. Changes 1 and 4 are being made to reduce the dependence of the department on Adjunct teaching during this period of budget contraction. Change 5 is being made to partially offset Change 3, particularly for seniors who are preparing for graduate school.

The revised sample schedule for the new curriculum is attached. The associated course revision forms are also attached.

Encl. (1, plus course approval forms)

RSF (NAVAI	ARCHITECTURE & MARINE ENGINEERING)
DOCE UNAVAL	ANCIHIECTURE & MARINE ENGINEERING)

B.S.E. (NAVAL ARCHI	TECTUR	L &	$\mathbf{M} P$	KI	NE	. Er	NGI	INE	LEK	IN
	Credit Hours				Te	rms				
		1	2	3	4	5	6	7	8	
Subjects required by all programs	s (55 hrs.)									
Mathematics 115, 116, 215, and 216		4	4	4	4	-	-	-	-	
Engr 100, Intro to Engineering.	. 4	4	_	_	_	_	_	_	_	
Engr 101, Intro to Computers	4	_	4	-	_	-	_	_	_	
Chemistry 125/126 and 130 or	•		·							
Chemistry 210 and 211	5	5	_	_	_	_	_	_	_	
Physics 140 with Lab 141;	3	,								
Physics 240 with Lab 241	10		5	5	_	_	_		_	
Humanities and Social Sciences	16	4	4	_	_	_	_	4	4	
Trumainties and Social Sciences	10	4	7	-	-	-	-	4	4	
Related Technical Core Subjects ((15 hrs.)									
ME 211, Intro. to Solid Mechanics	4	-	-	4	-	-	-	-	-	
ME 240, Intro. to Dynamics	4	-	-	-	4	_	-	-	-	
ME 235, Thermodynamics I	3	-	-	-	3	-	-	-	-	
IOE/Stat 265 Prob.& Stat. for Eng.	4	-	-	-	-	4	-	-	•	
Program Subjects (41 hrs.)										
NA 270, Marine Design	4	_	_	4	_	_	_			
NA 280, Marine Systems Manufacti		_	_	-	3	_	_	Ī	_	
NA 310, Marine Structures I	4	-	-	_	<i>-</i>	4	-	•	_	
NA 320, Marine Hydrodynamics I	4	-	-	_	-	4	-	-	•	
		-	-	-		-	4	-	-	
NA 321, Marine Hydrodynamics II	4	-	-		-		4	•	-	
NA 331, Marine Engineering I	. 3	-	-	-	-	3	-	-	-	
NA 332, Marine Electrical Engineer		-	-	-	-	-	3	-	-	
NA 340, Marine Dynamics I	4	-	-	-	-	-	4	-	-	
NA 470, Foundations of Ship Desig		-	-	-	-	-	-	4	-	
NA 475, Marine Design Team Proje		-	-	-	-	-	-	-	4	
NA 491, Marine Engr. Laboratory	4	-	-	-	-	-	-	4	-	
Technical Electives (8)	8	_	_	_	_	-	-	4	4	
Choose two from the following list.	At least one									
must come from the 1st four on t										
NA 410, Marine Structures II										
NA 420, Environmental Ocean Dyn	amics									
NA 431, Marine Engineering II										
NA 440, Marine Dynamics II										
NA 401, Small Craft Design										
NA 403, Sailing Craft Design Principles										
NA 562, Marine Systems Production Strategy and Operations Management										
Advanced Mathematics: Math/Stat4							16			
Ilmostoleta d Thestiana (0 to a)	0				2		4		2	
Unrestricted Electives (9 hrs.)	9		-	- 17	2		4	-	<u>.;</u>	
Total	128	17	17	17	16	15	15	16	15	

College Curriculum Committee, 1420 Lurie Engineering Center Building



Form Number 1335

Action Requested

New Course
 Modification of Existing Course
 Deletion of Course

Complete the following sections:

New Courses - B & C completely

Modifications - A modified information, B & C completely

Deletions - A & C completely

Date 2/18/2004

Effective Winter 2005

	A. CURREN	IT LISTIN	G			В. Н	EQUESTED LI	51ING		
	lome Department			Div#	Course Number	Home Dep NAVARC			Div # 284	Course Number 280
Cn	oss Listed Course Info	mation				Cross Listed	Course Information			
	ourse Title					Course Title				
						Marine S	Systems Manufact	uring		
	TITLE Time Sch Max = 1	ed Spaces				TITLE ABBRE-	Time Sched Max = 19 Spaces	Marine System	s Manu	FU.W.
	Transcri Max = 20					VIATION	Transcript Max = 20 Spaces	Marine System	s Manuf	
C	Course Description					Overvier all asper industry compon boatbuil design;	ription for Official Publication of the marine income of naval archite characteristics; of ents; materials us ding and offshore production engine ations; cost estima	dustry and its en- ecture and marin- organization; proded, joining methol equipment manu- pering; planning;	e engineerii duct types a ods, shipbui ifacturing m contracts ar	ng, including and Iding, ethods; nd
	PROGRAM	OUTCOME	S:		<u></u>	**********	RAM OUTCOM	Name and Address of the Control of t		
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	Degree Requirements	O Degree Re O Core Cour O Free Elect	se O Other	Elective		<u>l</u> .	O Free Ele	 	CIIVE	
☐ F	Prerequisites © Enforc	ed O Advised				Prerequisites	NA270 (C-) or concurrent © Enforced © Advise			
	redit estrictions					Credit Restrictions				
	evel of Credit Undergrad only Rackham Grad Non-Rckhm Grad Ugrad or Rckhm Gra Ugrad or Non-Rckhm	d	it types Grad w/add'l Work	Credit Hours Min Max	Contact Hrs/Wk Number of Wks	Level of C Si Undergrad Rackham Non-Rokh Ugrad or Ugrad or	d only ☐ All Cr Grad ☐ Rokhi im Grad	edit types m Grad w/add'l Work	Credit Hours Min Max 3 3	Contact Hrs/Wk 3 Number of Wks 14
C.	Repeatability Is this course repeatate Maximum Hours? Can it be repeated	ile? ○ Yes ⊙ Maxim	um Times?			Printing (course in the Bulletin course in the Time Schedi	ule	
	Class Type(s) M Lec Rec Sem Lab Dis	000	Rec Sem ⊠ A-E Lab □ CR/N· Dis □ S/U Ind □ P/F	¯ Lo C ⊠A ⊡B	cation nn Arbor iological Station amp Davis	Freq. of	☐ I ■ II ☐ IIIa ☐ IIIb ■ Yearly ☐ Alter Years I culty		'ears	alf term 1st 2nd 2nd arch Scientist
	☐ Ind ☐ Other	_	Other Y	ÖĒ	xtension		: Attach nomination if Cogniz	zant Faculty is not a regula	ar graduate faculty	
<u> </u>	Approval						Submitted By: Home De	ept. Cross-listed Dept.		
	Curriculum Cor	nm				Name, Signatu Home D	ept.	Just	Armin W. Tro	esch, NA&ME
□ F	Faculty Rackham Cross listed Ur	 nit 1			-	Cross-listed I	Dept(s).			
	Cross listed Ur									

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S I	IDD	ORTING	STAI	FMENT

In an attempt to meet anticipated budget cuts, and also the need to reduce current department deficits, the curriculum was exam and it was decided to eliminate one course and to merge its topics into two existing courses. This course (NA280) is developed by the course of the course and odding an arreliable of course than the climinate one course and odding a course to the course of the cours	2
taking the 2 credit NA276 course and adding one credit's worth of content from the eliminated course.	

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Are any special resources or facilities required for this course?	
Detail the Special requirements	
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#### UNIVERSITY OF MICHIGAN TL 2/20/04

#### DEPARTMENT OF NAVAL ARCHITECTURE AND MARINE ENGINEERING

## NA280 - MARINE SYSTEMS MANUFACTURING WINTER TERM

#### **COURSE OBJECTIVE:**

To present an overview of shipbuilding, boatbuilding, marine and offshore equipment building related aspects of all areas interfacing with naval architecture and marine engineering in order to enable students to continue their studies and/or enter industry with a basic knowledge of these areas.

#### CLASS SCHEDULE:

Two 1 1/2 hour sessions per week on Tuesdays and Thursdays from ?.30 to ?.00 PM.

INSTRUCTOR:

Thomas Lamb (Associate Professor)

Room 216 NA&ME (764-4509 with Voice Mail) Room 222 UMTRI (763-7408 with Voice Mail)

Home 332-3491 Fax 3320624 E-mail - nalamb@umich.edu

#### **NA&ME OFFICE HOURS:**

I will be available to meet with students in my office at NA&ME, except during class times. Please schedule a meeting by dropping in the NA&ME office when I am there, or by calling me on my telephones or by E-mail. My schedule/availability is posted on my door.

#### TEXT:

Course Class outlines and other material are posted on the Web and can be accessed at http://coursetools.ummi.umich.edu/200?Winter/navarch/2751

If you have trouble getting into this site from your student personal webpage do the following:

Access http://coursetools.ummu.umich.edu/

Click on Browse all IM Course Tools Sites

Select Term: Winter 200?

Select School: College of Engineering

Click on Display Sites

Scroll down to Naval Architecture/275

The assigned texts for the course are:

SHIP DESIGN AND CONSTRUCTION, Vol. I, by T. Lamb (Editor). Available from SNAME with Studnt disount

SHIP KNOWLEDGE, by Klaas van Dokkum, Avaible from Professor Lamb. Fill out order form.

#### PREREQUISITES:

Preceded by or taken concurrently with NA270 - MARINE DESIGN

#### **TEACHING METHOD:**

I will primarily use lectures, utilizing videos and slides of appropriate material and case study assignments. The assignments will assist understanding of the topics covered and facilitate student participation. A 10 minute Q&A period will be held at the start of each class. THIS IS NOT TIME TO LET LATECOMERS TURN UP, BUT FOR MEANINGFUL DIALOG. PLEASE BE THERE ON TIME. If previous class prevents you being in this class by 3.4PM please let me know at

beginning of semester. If you must miss a class, I would appreciate the courtesy of you letting me know.

#### TYPE OF WORKLOAD:

Students are encouraged to engage in class discussion of the lecture material as well as review of the assignments. Anticipated effort is:

Class Attendance	42 hours (excluding exam time)
Reading Assignments	42 hours
Task Assignments	42 hours
Exam (Take home)	16 hours
TOTAL EFFORT	134 HOURS

#### **EXAMS:**

There will be two take home open book exams. In addition eight, closed book, multiple choice, Pop Tests will be given throughout the semester, on class dates selected by the instructor. The pop test will be given at start of class so do not be late.

#### **GRADING:**

Mid-term Examination	30%
Final Examination	30%
Pop Tests	10%
Assignments	30%

### SCHEDULE, TOPICS AND READING ASSIGNMENTS:

	,		READING ASSIGNMENT
CLASS NO.	DATE	TOPIC	
1	1/ /	Introduction to Marine Industry	SD&C Chapter 3
2	1/ /	Ship and Boat Types and Components	SK Chapters 1 and 3
3	1/ /	Materials Overview	SD&C Chapter 22
4	1/ /	Material Joining	SD&C Chapter 22
5	1/ /	Material Joining	Class 5 Course Notes
. 6	1/ /	Composites	SD&C Chapter 21
7	1/ /	Materials Preservation	SD&C Chapter 13
8	1/ /	Introduction to Offshore Industry	SD&C Chapters 32 and 36 Class 9 Course Notes
9	2/ /	Introduction to Pleasure Boat Industry	Class 10 Course Notes
10	2/ /	Markets, Demand and Supply	
11	2/ /	Productivity	Class 11 Course Notes
12	2/ /	Competition	Class 12 Course Notes
13	2/ /	Specifications and Contracts	SD&C Chapter 9
14	2/ /	Marine Cost Estimating	SD&C Chapter 10
WEEK OF 2/	1	MID-TERM EXAM - TAKE HOME	
	2/ /	SPRING BREAK	
-	.2/ /	SPRING BREAK	or of 2 9 7 5D 6C Chan 25
15	3/ /	Modern Shipbuilding Practice	SK Chaps 3 & 7, SD&C Chap 25
16	3/ /	Offshore Equipment Construction Practice	Class 16 Course Notes
17	3/ /	Shipyard Layout & Equipment	SD&C Chapter 26
18	3/ /	Design for Production	SD&C Chapter 14
19	3/ /	Engineering for Ship Production	SD&C Chapter 14 Class 20 Course Notes
20	3/ /	Shipyard Organization & Management	Class 21 Course Notes
21	3/ /	Group Technology & Work Breakdown Structures	<del></del>
22	3/ /	Build Strategy	SD&C Chapter 14 Class 23 Course Notes
23	4/ /	Planning and Scheduling	<del></del>
24	4/ /	Production & Material Control	Class 24 Course Notes
25	4/ /	CAD/CAM Applications	Class 25 Course Notes
26	4/ /	Simulation Based Design	Class 26 Course Notes
WEEK OF 4/		FINAL EXAM - TAKE HOME DUE 4/ /	

#### **ASSIGNMENTS:**

Reading assignments should be completed prior to class so as to maximize understanding of class presentation.

The assignments will be based on course material. From assignment 5 onward, a sequential development of a new shipyard, boatyard or offshore equipment building site and the various methods and procedures necessary to make it operational. Each student, or groups of up to three students, will select either a ship, a small boat or an offshore platform/rig for which they will develop their assignments:

#### Task Assignments:

Number	Hand	in Requirements
	Class	
1	5	A paper describing what industry segment you are interested in and why
2	9	Material Selection for Different marine Products
3	12	Welding Sizing and Symbols Exercise
4	16	Prepare a Cost Estimate
5	20	Prepare a description of your shipyard layout and work flow
6	23	Prepare a Work Breakdown Structure
7	25	Prepare a Build Strategy Outline
8	WE	Describe the CAD/CAM applications you would use in your company and why

Assignments shall consist of a 2 to 4 page report plus drawings, as appropriate, which will be graded based on:

Understanding of topic Feasibility of approach Extent of effort and completeness Presentation (Format, tidiness)

It is preferred that text be typed, single spacing.

Calculations shall be as required.

STEP II: Develop Course Objectives and Outcomes

COURSE #: NA 280	COURSE TITLE: Marine Systems Manufacturing
TERMS OFFERED: Winter	PREREQUISITES:
	Corequisite NA 270
INSTRUCTOR(S): Lamb, Spicknall	SCIENCE/DESIGN: 1.0 / 0.0
CATALOG DESCRIPTION:	COURSE TOPICS:
	1. Industry Characteristics
Overview of the marine industry and its environment as it relates to all	2. Ship types and components
aspects of naval architecture and marine engineering, including industry characteristics: organization: product types and components: materials	3. Materials 4. Joining methods
used, joining methods, shipbuilding, boatbuilding and offshore	5. Marine markets, demand and supply
equipment manufacturing methods; design; production engineering;	6. Productivity and competitiveness
planning; contracts and specifications; cost estimating; production and	7. Contracts and Specifications
material control.	8. Marine cost estimating
	9. Shipyard layout and equipment
	10. Modern shipbuilding practice
	hreakdown structures
	12. Planning, scheduling and production & material control
	12. Shipbuilding policy and build strategy 14. CAD/CAM/CIM & Simulation based design
	15. Shipyard organization and management

COURSE	COURSE
OUTCOMES*	OBJECTIVES
<ol> <li>Know the basic business relationships of the marine industry. [Objectives 1,3]</li> <li>Understand the basic types of ships and other equipment used in the marine industry. [3]</li> <li>Be able to describe the components of a ship. [4,6]</li> <li>Understand the market dynamics of the marine industry. [1,3,6]</li> <li>Know the factors that influence competitiveness in the marine industry. [3,6]</li> <li>Know the need and use of contracts and specifications. [3,6]</li> <li>Develop cost estimates for ships [1,3,4]</li> <li>Be able to analyze shipyard layouts and determine product material flow and processes used. [5]</li> <li>Apply Design for Production in future design courses. [5]</li> <li>Opply Group Technology to future process related tasks. [5]</li> <li>Understand the need for and use of Work Breakdown Structures. [1,2,6]</li> <li>Understand the planning, scheduling and control tools used in the marine industry. [1,5,6]</li> <li>Use a shipyard's shipbuilding policy to develop a build strategy for a ship. [1,2,5,6]</li> <li>Understand the organization of shipyards and the way they are managed. [1,2,6]</li> <li>Understand the organization of shipyards and the way they are managed. [1,2,6]</li> <li>Apply correct approach to written technical communication. [6]</li> </ol>	<ol> <li>To give students a broad understanding of the industry in which they will practice after graduation. This in turn should help them decide in which sector of the industry to focus their future studies.</li> <li>To provide a foundation and framework on which to develop their detailed understanding of the core courses that they will take throughout their remaining undergraduate education.</li> <li>To teach students the different business segments in the marine industry.</li> <li>To teach students the basic components of a ship and offshore product.</li> <li>To teach students basic modern shipbuilding practices.</li> <li>Provide experiences for students to practice written communications skills.</li> </ol>

	TOOLS	ASSESSMENT	
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- 8 quizzes test individual student's understanding and retention of course material covered since previous quiz-[Outcomes 1-15]
- [Outcomes1-15]. Mid-term and final examinations measure individual student's depth of understanding of the course subject.
- 8 assignments measure individual student's depth of understanding of specific topics and gives them an opportunity to be innovative and creative. [Outcomes 1-16] The technical communications assessment is conducted with the assistance of the College Of Engineering Tech Comm Department.
- Course evaluation by each student at the end of the course, used for assessing all outcomes of the course

^{*}Numbers in brackets following each course outcome indicate corresponding course objective.

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THE UNIVERSITY OF MICHIGAN — COLLEGE OF ENGINEERING Course Approval Request College Curriculum Committee, 1420 Luris Engineering Center Building

Form Number 1336

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STEP II: Develop Course Objectives and Outcomes

COURSE #: NA 562	COURSE TITLE: Marine Production Engineering, Planning, and Control
TERMS OFFERED: Fall	PREREQUISITES: NA 280 Marine Systems Manufacturing
	or graduate standing
INSTRUCTOR(S): Spicknall	SCIENCE/DESIGN:
CATALOG DESCRIPTION:	COURSE TOPICS:
Examination of business strategy development, operations management principals and methods, and design-production	<ol> <li>Fundamental Physics and Behavioral Characteristics of Production Systems</li> </ol>
integration methods applied to the production of complex marine systems such as ships, offshore structures, and yachts.	2. Production System Analysis for Applicability To Complex Marine System Production
Addresses shipyard and boat yard business and product	3. Production Engineering for Complex Marine Systems
strategy definition, operations plaining and scheduling, performance measurement, process control and improvement.	5. Medium-Range, or "Master," Planning For Ship/Boat Yards
	6. Detailed, or "Shop Floor," Planning For Ship/Boat Yards
	<ol> <li>Production Control and Performance Measurement For Ship/Boat Yards</li> </ol>
	8. Cost and Schedule Risk Assessment For Ship/Boat Yards Operations
	<ol> <li>Uperations Improvement Strategies and Methods For Ship/ Boat Tards</li> </ol>

STEP II: Develop Course Objectives and Outcomes NA 562 continued

# **OBJECTIVES** COURSE

- To give students an understanding of the fundamental principals and terminology of production and operations management.
  - To give students a thorough understanding of the group-technology-based production approach that is the most efficient for producing complex marine systems.
    - To provide students with a background in the fundamentals of production engineering / design-for-production principals as applied to complex marine systems.
- To teach students planning and scheduling, production control, performance measurement, and cost and schedule risk assessment methods that are appropriate for ship and boat yards. Ŋ.
  - To teach students methods of ship and boat yard operations improvement.
- To provide students with some basic experience with technologies that support production engineering for complex marine systems, and ship / boat yard operations planning and management.
- To provide an opportunity for students to develop a broad business perspective of ship / boat yard operations, and to help teach them the value of cross-functional collaboration and teamwork in design, planning, and operations management.

STEP II: Develop Course Objectives and Outcomes NA 562 continued

	The student:
	1. Understands the fundamental physics and behavioral characteristics of production systems. [objective 1] 2. Understands the basic terminology associated with production, production engineering, and operations
COURSE OUTCOMES*	management. [1, 2, 3, 4, 5] 3. Can solve basic utilization / cycle time / capacity / inventory and production line balancing problems. [1]
	5. Can explain a group-technology-based production approach, and describe why it is typically most appropriate for the production of complex marine systems. [2, 7]
	6. Can apply basic production engineering principals to the design of a complex marine system. [3, 7]
	associated product structure. [3, 4, 7]
	8. Can explain the objectives and outputs of long-range planning. [4, 7]
	9. Can develop and use mathematical models to assist with long-range planning and medium-range aggregate
	production plaining in a supt boat yate. [4, 6, 7]  10. Can work effectively with others to develop a work breakdown structure for a ship at the medium-range planning
	unit and critical resource level of detail. [4, 7]
	11. Can work effectively with others to develop resource-loaded master production schedules for complex marine
	systems. [4, 6, 7] 12. Can develop schedule-driven medium-range cost estimates and derive associated cost and schedule risk. [4, 6, 7]
	13. Can carry out basic statistical quality control activities, and use the resulting data for process control, process
	improvement, and production engineering. [3, 4, 5, 6, 7]
	14. Understand the strengths and weaknesses of various operations philosophies, planning and scheduling methods,
	performance measurement and control methods, and technologies relative to their apparature) at the compress marine system production domain. [2, 4, 5, 6, 7]

*Numbers in brackets following each course outcome indicate corresponding course objective.

STEP II: Develop Course Objectives and Outcomes NA 562 continued

Course Title:

NA562 Marine systems Production Business Strategy

and Operations Management

Course Function:

B.S.E. Technical Elective; MEng required course

Cognizant Faculty:

Mark Spicknall

Credit Hours:

4 credits

Schedule:

Fall semester annually

Prerequisite:

NA280

Short Description:

Examination of business strategy development, operations management principals and methods, and design-production integration methods applied to the production of complex marine systems such as ships, offshore structures, and yachts. Addresses shipyard and boat yard business and product strategy definition, operations planning and scheduling, performance measurement,

process control and improvement.

Text:

Course pack

#### Outline

- Overview of ship, offshore, yacht, and pleasure boat industries
  - o Market information and competitive overview
  - Overall production approach -
    - impact of volume
    - impact of degree of product customization
    - type of product structure
  - Typical production processes -
    - overall production flow
    - specific work centers and process lanes together with their intermediate product types/groups/families
- Physics of production systems
  - o relationships between demand, capacity, utilization, and inventory
  - o impact of variability on utilization and inventory
  - o implications for marine systems production business strategy and operations management as compared to other types of products
- Typical shipyard and yacht yard operations management
  - Strategic product and capacity planning
  - o Medium-range "master" planning
  - Detailed "shop floor" planning
  - Process measurement & control (cost/productivity, schedule, quality)
  - o Differences in operations management for producing offshore products
  - Differences in operations management for producing small series-production boats
- Operations process improvement methods & marine systems cases
  - o TOM
  - o BPR

- Integrated approaches
   Integration of design and planning with production operations
   Detail design / design-for-production approaches
   Operational integration of design and planning with production