EGN 3420 - Engineering Analysis

Catalog Description: EGN 3420: PR: A High-level computer Language, MAC 2312. Engineering Applications of numerical methods, Including curve fitting, matrix operations, root finding, Integration, and plotting.

Textbook: Chapra, S.C., Applied Numerical Methods with Mathlab For Engineering and Scientist, McGraw-Hill (3rd edition)

Instructor: C.S. Bauer, Ph.D., P.E., C.M.S.P, Professor of Engineering (ret.) Phone 407-823-2236, Office HEC 359, Email: christian.bauer@ucf.edu

Students: Desiring a guaranteed appointment time are asked to Make prior arrangements with the instructor in class or by phone or email.

Objective: This course is designed to provide freshman and Sophomore ECE students with a brackground in The theory and application of matrices, and an Introduction to numerical methods (with Computer Oriented analysis) and an understanding of the Relationship between error and digits of Significance. The MATLAB programming System will be used for Course assignments.

Prerequisiteds by Topic: 1. Understanding of differential and Integral calculus Of one variable. (MAC 2312)

2. Familiarity with a high-level computer Language. (COP 3223)

Topics:

1. Introduction: Mathematical Modeling, Numerical Methods, and Problem Solving.

2,3. Matlab will be covered by class lectures.

4. Round off and Truncation Errors
5. Roots: Bracketing Methods
6. Roots: Open Methods

8. Linear Algebraic Equations and Matrices
9. Gauss Elimination

11. Matrix Inverse and Condition
12. Iterative Methods
13. Linear Regression
14. General Linear Least Squares and Nonlinear Regression
15. Polynomial Interpolation
17. Numerical Integration
18. Numerical Integration of Functions

Computer Usage: Eight homework assignments which require a computer-Aided analysis will be assigned as the semester progress. Each assignment will have a one week deadline for Completion.

Grading Scheme: (The +/- will not be used in this course.)

Homework: (8-1 week each)	25%
Test I (open book)	25%
Test II (open book)	25%
Test III (open book)	25%

Test III is during last day of class, but is not comprehensive.

Additional Information:

1. LATE homework will not be accepted.

2. Homework is due at the BEGINNING of class on the day it is due. Homework is late if it is not in the instructor's possession at the start Of class on the day it is due.

3. Homework assignments are individual project-NO group projects (i.e., do your own work.) You may consult with others on procedures, Algorithms, etc., but identical computer programs are not allowed.

4. If you cannot be present for an exam, notification and arrangements MUST be made prior to the start of the exam.

5. Some additional class policies may be stated during the lectures.

6. Students are responsible for keeping current with reading assignments And for resolving areas of misunderstanding through questions in class Or visits to the instructor's office (with an appointment).

Fall '11 Significant Dates

Class Begin	Monday, August 22
Drop/Swap Deadline	Thursday, August 25
Labor Day Holiday	Monday, Sept 5
Veterans Day	Friday, November 11
Thanksgiving	November, 24-26
Classes End	Saturday, December 3
Final Exam Period	December 5 -10

(Exam III will be held at Final Exam Time)

ND DECIMAL CONVERSION

ecimal: Find the decimal weights for corresponding
racters beginning with the least significant character.
ecimal weights is the decimal value of the hexadecimal

xadecimal: Find the highest decimal value in the table
an or equal to the decimal number to be converted.
g hexadecimal character is the most significant. Sub-
value found from the decimal number to be converted.
e repeat the process to find subsequent hexadecimal

Hex	Dec
0	0
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
A	10
B	11
C	12
D	13
E	14
F	15

Hex	Dec
0	0
1	16
2	32
3	48
4	64
5	80
6	96
7	112
8	128
9	144
A	160
B	176
C	192
D	208
E	224
F	240

Hex	Dec
0	0
1	256
2	512
3	768
4	1,024
5	1,280
6	1,536
7	1,792
8	2,048
9	2,304
A	2,560
B	2,816
C	3,072
D	3,328
E	3,584
F	3,840

	0	1	2	3	4	5	6	7
0	4,096							
1	8,192							
2	12,288							
3	16,384							
4	20,480							
5	24,576							
6	28,672							
7	32,768							
8	36,864							
9	40,960							
A	45,056							
B	49,152							
C	53,248							
D	57,344							
E	61,440							
F								

(5)

ASCII CHART

ASCII CHARACTER SET (7-Bit Code)

MS Dig. / LS Dig.	.0	1	2	3	4	5	6	7
0	NUL	DLE	SP	0	@	P	`	p
1	SOH	DC1	!	1	A	Q	a	q
2	STX	DC2	"	2	B	R	b	r
3	ETX	DC3	#	3	C	S	c	s
4	EOT	DC4	$	4	D	T	d	t
5	ENQ	NAK	%	5	E	U	e	u
6	ACK	SYN	&	6	F	V	f	v
7	BEL	ETB	'	7	G	W	g	w
8	BS	CAN	(	8	H	X	h	x
9	HT	EM	)	9	I	Y	i	y
A	LF	SUB	*	:	J	Z	j	z
B	VT	ESC	+	;	K	[	k	{
C	FF	FS	,	<	L	\	l	|
D	CR	GS	-	=	M	]	m	}
E	SO	RS	.	>	N	^	n	~
F	SI	US	/	?	O	_	o	DEL

BONUS: DECODE THIS ASCII HEX STRING FOR
2 BONUS POINTS ~ |47|4F|20|47|41|54|4F|52|53|07|

11 HINT =

this program:
pgm. muscle
ttty output
precision req'd.

INDIVIDUAL WORK REQ'D
(TEAM SOLUTIONS NOT ACCEPTED)

(6)

(LANG. (OPTIONAL) ~~FORTRAN~~) program which will Print a table of the following form giving the monthly mortgage payment and total amount of payments on a $100,000 house loan:

MORTGAGE PAYMENT PLAN

PRINCIPAL	INTEREST RATE	DURATION (YEARS)	MONTHLY PAYMENT	TOTAL PAYMENT
100 000.00	XX, XX	NN	XXXXX.XX	XXXXXX.

Exercise the program for interest rates of 6, 7, 8, 9, and 10 percent, and each rate for mortgage periods of 5, 10, 15, 20, 25, and 30 years.

The formulas to compute the monthly payment and total amount are

$$M = \frac{P \cdot \frac{I}{12}}{1 - \left(\frac{1}{1 + \frac{I}{12}}\right)^{T \cdot 12}}$$

$$A = M \cdot T \cdot 12$$

where:

P = principal
I = interest rate
T = mortgage duration in years
M = monthly payment

FROM Lehmkuhl, Fortran 77 - A Top Down Approach, MacMillan, 1983

Select C:\Documents and Settings\Josh\Desktop\UCF\EGN 3420\3420 assign 1.exe

Principal	Interest	Years	Payment	Total
100000	0.06	5	1933.28	115996.81
100000	0.06	10	1110.21	133224.60
100000	0.06	15	843.86	151894.23
100000	0.06	20	716.43	171943.45
100000	0.06	25	644.30	193290.42
100000	0.06	30	599.55	215838.19
100000	0.07	5	1980.12	118807.19
100000	0.07	10	1161.08	139330.18
100000	0.07	15	898.83	161789.09
100000	0.07	20	775.30	186071.74
100000	0.07	25	706.78	212033.76
100000	0.07	30	665.30	239508.90
100000	0.08	5	2027.64	121658.37
100000	0.08	10	1213.28	145593.11
100000	0.08	15	955.65	172017.38
100000	0.08	20	836.44	200745.62
100000	0.08	25	771.82	231544.87
100000	0.08	30	733.76	264155.25
100000	0.09	5	2075.84	124550.13
100000	0.09	10	1266.76	152010.93
100000	0.09	15	1014.27	182567.99
100000	0.09	20	899.73	215934.23
100000	0.09	25	839.20	251758.91
100000	0.09	30	804.62	289664.14
100000	0.10	5	2124.70	127482.27
100000	0.10	10	1321.51	158580.88
100000	0.10	15	1074.61	193428.92
100000	0.10	20	965.02	231605.19
100000	0.10	25	908.70	272610.22
100000	0.10	30	877.57	315925.77

Press any key to continue . . .

$$M = \frac{P \cdot \left(\frac{I}{12}\right)}{1 - \left(\frac{1}{1 + \frac{I}{12}}\right)^{T \cdot 12}}$$

hurricane info and maps

http://www.nhc.noaa.gov