Kingdom of Saudi Arabia
Ministry of Higher Education
Majmaah University
Zulfi, College of Sciences
Mathematics Department

جامعة المجمعة
Majmaah University

المملكة العربية السعودية
وزارة التعليم العالي
جامعة المجمعة
كلية العلوم بالزلفي
قسم الرياضيات

COURSE CLASSIFICATION FORM

Course Number/Name		Math 471 Introducction to topology	
Prepared by		**Dr. Abd El-Nasser Ghareeb**	
Program Learning Outcomes	**Levels* (0,1,2, 3,4,5)**	**Relevant Activities**	**Assessment Methods/Metrics**
a1. Apply fundamentals and concepts of mathematics.	5	- Lectures - assignments	• 3 Midterm and final exam • Home work
a2. Apply fundamentals and concepts General sciences and Computer skills.	3	- assignments on logic statements	• 1 Midterm and final exam • Home work
a3. Realize Social and ethical values	0		•
b1. Read and construct mathematical arguments and proofs.	4	- Lectures - assignments	Home work
b2. Apply critical thinking skills to solve problems that can be modeled mathematically.	5	- Lectures - assignments - Oral discussion	• 3 Midterm and final exam+ Home work
c1. Work independently and within a team	3	Divided students into groups and using oral discussion with homework	• Home work
c2. Bear responsibility for different situations.	2		• Quizzes
c3. Realize codes of ethics and their importance.	0		
d1. Communicate a depth and breadth of mathematical knowledge, both orally and in writing.	4	- Lectures - assignments - Oral discussion	• 3 Midterm + final exam • Home work • Quizzes
d2. Ability to Organize, connect and communicate mathematical and algorithmic ideas.	4	- Lectures - assignments	• Home work • Quizzes
d3. Critically interpret numerical and graphical data.	3	- assignments on information data and represented data	• Home work • Quizzes
e1. Use computer and its applications as an office tool	3	- assignments on Logical expression	Home work Quizzes

* **Please mark (or type) High (5), Medium-High (4), Medium (3), Low-Medium (2), Low (1) or Not At All (0) indicating the level to which you believe, as an instructor, the students have achieved these outcomes in this course.**

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Course Objectives and Outcomes

Course Number: MATH 471 **Course Name: Introduction to topology**

Prepared by: Dr. Abd El-Nasser Ghareeb

Table 1: Relationship of course objectives/outcomes with PLO and ASIIN Criteria

Course Objectives:	Course Outcomes:	ASIIN	PLO
Have the knowledge of topological spaces and its properties.	**Define** and **recognize** the topological spaces and its properties.	a, b, e, m	
	Improve and **outline** the logical thinking.	b, c	
	Illustrate how to communicating with: Peers, Lecturers and Community.	l, n	
Have the knowledge of derived set, Topological subspaces, Bases, finite product topology, subbases.	**Define** and **recognize** the derived set, Topological subspaces, Bases, finite product topology, subbases.	a, b, c, g, m , j	
	Shown the ability of working independently and with groups.	n	
	Illustrate how take up responsibility.	l, n	
Studying the Metric spaces, metrizability, Continuous functions, characterization of continuous functions on topological and metric spaces.	**Define** and **recognize** the Metric spaces, metrizability, Continuous functions, characterization of continuous functions on topological and metric spaces.	a, b, f, h	
	ability to **write** Mathematical equations in a correct mathematical way	a, j, g	
Studying the homeomorphisms and Topological property.	**Define** and **recognize** the homeomorphisms and Topological property	a, c, h	
	Appraise how to Use the computer skills and library.	d, h	
	Illustrate how to Search the internet and using software programs to deal with problems	d, h	
Have the knowledge of Compact spaces and their properties.	**Define** and **recognize** Compact spaces	a, e, i	
	interpret how to Know the group theory using the internet	k, h, g	
Studying the Limit point.	**Define** and **recognize** the Limit point	a, i	
	interpret how to Know Limit point using the internet	h, k	
Studying sequentially compact spaces and their properties.	**Define** and **recognize** the sequentially compact spaces	a, i	

	interpret how to Know the filed using the internet	k, h, g	

Table 2: Methods of assessment of course syllabus

.

Assessment Method	Number/Type				Instructor Assessed	TA/Grader Assessed	Peer/Self Assessed
Homework	5 homework assignments				x		
Mid Terms/Final Exams	2 mid-term; 1 final exam				x		
Quizzes	One biweekly				x		
Individual Projects	1-2 wks	3-4 wks	1/2 sem	Full sem			
Team Projects	1-2 wks	3-4 wks x	1/2 sem	Full sem x	x		x
Lab Assignments							
Computer Assignments							
Computer Tools Used							
Oral Presentations	one				x		x
Written Reports	one				x		
Other	Design project (project binder)				x		

Outcome of ASIIN	
a	Graduates have sound mathematical knowledge. They have a profound overview of the contents of fundamental mathematical disciplines and are able to identify their correlations.
b	Graduates are able to recognise mathematics-related problems, assess their solvability and solve them within a specified time frame.
c	Graduates have a basic ability to work in a scientific way. They are in particular able to formulate mathematical hypotheses and have an understanding of how such hypotheses can be verified or falsified using mathematical methods.
d	Graduates can flexibly apply mathematical methods of fundamental component areas of mathematics and are able to transfer the findings obtained to other component areas or applications.
e	Graduates have abstraction ability and are able to recognise analogies and basic patterns
f	Graduates are able to think in a conceptual, analytical and logical manner.
g	Graduates have an extensive comprehension of the significance of mathematical modelling. Are able to create mathematical models for mathematical problems as well as for problems in other areas of science or everyday life, and have a selection of problem solving strategies at their disposal.
h	Graduates can use basic methods of computer-aided simulation, mathematical software and programming to solve mathematical problems
i	Graduates are in a position to solve more extensive mathematical
j	Graduates can classify, recognise, formulate and solve mathematics-related problems
k	Graduates use electronic media competently
l	Graduates can implement lifelong learning strategies. A prerequisite for this is that the students are per-severing and that they have developed persistence**.**
m	Graduates can recognise, formulate, classify and solve problems in a mathematical context
n	Graduates can communicate, possibly also in a foreign language, and contribute their work effectively in teams

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Instructor Course Evaluation Form

The purpose of this evaluation is to collect instructor feedback for improving this course and the Mathematics program. Information will also be used for program accreditation purposes.

I. Program Learning Outcomes Evaluations

Course Number/Name	MATH 471 Introduction to topology	Semester	First 1434/1435
Instructor	Dr. Abd El-Nasser Ghareeb		

The course listed above is designed for students to achieve the following outcomes at a Not At All, Low, Low- Medium, Medium, Medium-High or High level.

Please mark (or type) High (5), Medium-High (4), Medium (3), Low-Medium (2), Low (1) or Not At All (0) indicating the level to which you believe, as an instructor, the students have achieved these outcomes in this course.

Program Learning Outcomes	Relevant Activities	5	4	3	2	1	0
a1. Apply fundamentals and concepts of mathematics.	- Lectures - assignments	5					
a2. Apply fundamentals and concepts General sciences and Computer skills.	- assignments on logic statements			3			
a3. Realize Social and ethical values.							0
b1. Read and construct mathematical arguments and proofs.	- Lectures - assignments		4				
b2. Apply critical thinking skills to solve problems that can be modeled mathematically.	- Lectures - assignments - Oral discussion	5					
c1. Work independently and within a team	Divided students into groups and using oral discussion with homework			3			
c2. Bear responsibility for different situations.					2		
c3. Realize codes of ethics and their importance.							0
d1. Communicate a depth and breadth of mathematical knowledge, both orally and in writing.	- Lectures - assignments - Oral discussion		4				
d2. Ability to Organize, connect and communicate mathematical and algorithmic ideas.	- Lectures - assignments		4				
d3. Critically interpret numerical and graphical data.	- assignments on information data and represented data			3			
e1. Use computer and its applications as an office tool	- assignments on Logical expression			3			

II. Catalog Description , and Course Prerequisites Evaluations:

Based on your experiences in the course, please respond by circling the most appropriate number. Circle N/A for items that are not applicable, or if you have no opinion.

Catalog Description 1434-1435	• Topological Spaces and examples. • closure of a set and derived set. • Topological subspaces. • Bases, finite product topology and subbases. • Metric spaces, examples and metrizability. • Continuous functions and characterization of continuous functions and homeomorphisms. • Topological property. • Compact spaces. • Limit point and sequentially compact spaces.						
Course Prerequisites:	PMTH 112 + PMTH127	**Circle One (5=Strongly Agree; 1=Strongly disagree)**					
2a. Do you believe that the catalog description (above) is accurate for this course?		**(5)**	**4**	**3**	**2**	**1**	**N/A**
2b. Do you believe that the course prerequisites (above) are appropriate for this course?		**5**	**(4)**	**3**	**2**	**1**	**N/A**
2c. If not, please list any prerequisites you believe are not appropriate for this course.							

III. Textbook(s) and/or Lab Manuals (if applicable) Evaluations:

Textbook(s) and/or Lab Manuals (if applicable):	• James Munkers: Topology : A first Course, Prentice Hall, 1975 • S. Willard: General Topology, Reading M A, 1970 • D. Goshi: Introduction to General Topology, New Delhi 1986 .	**Circle One (5=Strongly Agree; 1=Strongly Disagree)**					
3a. In general, do you believe this to be an appropriate textbook for this course?		**(5)**	**4**	**3**	**2**	**1**	**N/A**
3b. Was the organization of the textbook appropriate for this course?		**5**	**(4)**	**3**	**2**	**1**	**N/A**
3c. Was the level of the textbook appropriate for this course?		**5**	**(4)**	**3**	**2**	**1**	**N/A**

IV. Computer usage (if applicable) Evaluations:

Computer usage (if applicable):		**Circle One (5=Strongly Agree; 1=Strongly Disagree)**					
5a. Was the use of computer well integrated with the course?		**5**	**4**	**(3)**	**2**	**1**	**N/A**
5b. Was the computer lab adequately equipped with well-maintained and updated computers?		**5**	**4**	**3**	**2**	**(1)**	**N/A**

5c. Was the computer lab equipped with sufficient number of computers?	**5**	**5**	**5**	**2**	**1**	**(N/A)**
5d. Were the special software packages (MATLAB, SPSS, C+, FORTRAN, etc) available and accessible?	**5**	**4**	**3**	**2**	**1**	**(N/A)**
5e. Was adequate technical support available when needed?	**5**	**4**	**3**	**2**	**1**	**(N/A)**

اسم المادة:- مقدمة في التوبولوجيا رقم ورمز المادة: MATH 471 + MAT 373-Z المستوى:- السابع تاريخ الامتحان:- 1435-8-3

Answer the Following Questions

Question 1: **[10 marks]**

(1) Define the topology on a set X and find all possible topologies for the set $X = \{a, b, c\}$.

Solution:

Definition: *Let X be a set and let $\Im$ be a collection of subsets of X satisfying the following three onditions:*

[T1]: $\varnothing \in \Im, X \in \Im$

[T2]: *If* $G_1 \in \Im$ *and* $G_2 \in \Im$, *then* $G_1 \cap G_2 \in \Im$

[T3]: *If* $G_\lambda \in \Im$ *for every* $\lambda \in \Lambda$ *where* Λ *is an arbitrary set, then,*

$$\cup\{G_\lambda : \lambda \in \Lambda\} \in \Im$$

Then $\Im$ *is called a* **topology** *for X, the member of* $\Im$ *are called* $\Im$-**open** (*or simply open*) *sets and the*

$\Im_1 = \{\varnothing, X\}$

$\Im_2 = \{\varnothing, \{a\}, \{b,c\}, X\}$

$\Im_3 = \{\varnothing, \{a\}, \{b\}, X\}$

$\Im_4 = \{\varnothing, \{a\}, X\}$

$\Im_5 = \{\varnothing, \{a\}, \{b\}, \{a,b\}, X\}$

$\Im_6 = \{\varnothing, \{a,b\}, X\}$

$\Im_7 = \{\varnothing, \{b\}, \{a,b\}, X\}$

$\Im_8 = \{\{a\}, \{b,c\}, X\}$

$\Im_9 = \{\varnothing, \{a\}, \{b\}, \{a,b\}\}$

$\Im_{10} = \{\varnothing, \{a,b\}, \{b,c\}; X\}$

$\Im_{11} = \{\varnothing, \{a\}, \{b\}, \{c\}, \{a,b\}, X\}$

$\Im_{12} = \{\varnothing, \{a\}, \{b\}, \{c\}, \{a,b\}, \{b,c\}, \{c,a\} X\}.$

(2) Prove that a mapping f of a space X onto another space Y is continuous if and only if

$$\overline{f^{-1}(B)} \subset f^{-1}(\bar{B})$$

for every $B \subset Y$.

Solution:

Let f be a continuous function and $B \subset \bar{B}$. Then $f^{-1}(B) \subset f^{-1}(\bar{B})$. But $f^{-1}(\bar{B})$ is closed set, then $\overline{f^{-1}(B)} \subset f^{-1}(\bar{B})$.

Now let $\overline{f^{-1}(B)} \subset f^{-1}(\bar{B})$, and let $B = \bar{B}$, then $\overline{f^{-1}(B)} \subset f^{-1}(B)$. But we know that $f^{-1}(B) \subset \overline{f^{-1}(B)}$. Then $f^{-1}(B)$ is closed set and hence f is continuous.

Question 2: **[10 marks]**

(1) Prove that the intersection of two topologies is also topology, but the union of two topologies is not necessary a topology.

Proof: Let $\Im_1$, $\Im_2$ be two topologies on set X, then to show $\Im_1 \cap \Im_2$ is a topology on X *i.e.* to prove

[T1]: Let $X \in \Im_1, X \in \Im_2 \Rightarrow X \in \Im_1 \cap \Im_2$

and $\varnothing \in \Im_1, \varnothing \in \Im_2 \Rightarrow \varnothing \in \Im_1 \cap \Im_2$

[T2]: Let $G_1 \in \Im_1 \cap \Im_2 \Rightarrow G_1 \in \Im_1 \text{and } G_1 \in \Im_2$

and $G_2 \in \Im_1 \cap \Im_2 \Rightarrow G_2 \in \Im_1 \text{and } G_2 \in \Im_2$

$\therefore$ $G_1 \in \Im_1, G_2 \in \Im_1 \Rightarrow G_1 \cap G_2 \in \Im_1$ (since $\Im_1$ is topology)

$G_1 \in \Im_2, G_2 \in \Im_2 \Rightarrow G_1 \cap G_2 \in \Im_2$ (since $\Im_2$ is topology)

$\therefore$ $G_1 \cap G_2 \in \Im_1, G_1 \cap G_2 \in \Im_2 \Rightarrow G_1 \cap G_2 \in \Im_1 \cap \Im_2$

[T3]: Let $G_1 \in \Im_1 \cap \Im_2$ and $G_2 \in \Im_1 \cap \Im_2$ then show $G_1 \cup G_2 \in \Im_1 \cap \Im_2$

as $G_1 \in \Im_1 \cap \Im_2 \Rightarrow G_1 \in \Im_1 \text{and } G_2 \in \Im_2$

and $G_2 \in \Im_1 \cap \Im_2 \Rightarrow G_2 \in \Im_1$ and $G_2 \in \Im_2$

$\therefore$ $G_1 \in \Im_1, G_1 \in \Im_2 \Rightarrow G_1 \cup G_2 \in \Im_1$

and $G_1 \in \Im_2, G_2 \in \Im_2 \Rightarrow G_1 \cup G_2 \in \Im_2$

Hence $G_1 \cap G_2 \in \Im_1, G_1 \cap G_2 \in \Im_2 \Rightarrow G_1 \cap G_2 \in \Im_1 \cap \Im_2$

Then $\Im_1 \cap \Im_2$ is topology on X.

IInd part

Let $X = \{a,b,c\}$, then $\Im_1 = \{X, \varnothing, \{a\}\}$ and $\Im_2 = \{X, \varnothing, \{b\}\}$ are two topologies on X, then

$$\Im_1 \cup \Im_2 = \{X, \varnothing, \{a\}, \{b\}\}$$

Let $\{a\} \in \Im_1, \{b\} \in \Im_2 \Rightarrow \{a\} \cup \{b\} = \{a,b\} \notin \Im_1 \cup \Im_2$

$\Rightarrow \Im_1 \cup \Im_2$ is not topology on X.

(2) Consider the following subsets of R with the usual topology :

$$A =]2,3[,\quad B =]3,4[\quad \text{and} \quad C = [3,4[$$

Show that A, B are separated sets and A, C are not separated.

Illustration: Consider the following subsets of R (with usual topology).

$$A =]2,3[, B =]3,4[\text{ and } C = [3,4[$$

The sets A and B are separated since $\overline{A} = [2,3]$ *and* $\overline{B} = [3,4]$, *so that* $A \cap \overline{B} = \varnothing$ *and* $\overline{A} \cap B = \varnothing$.
But A and C are not separated since

$$\overline{A} \cap C = [2,3] \cap [3,4[= \{3\} \neq \varnothing$$

Question 3: **[10 marks]**

(1) If A and B are separated subsets of a space X and $C \subset A$ and $D \subset B$, prove that C and D are also separated.

Proof: We are given that

$$A \cap \overline{B} = \varnothing \text{ and } \overline{A} \cap B = \varnothing \quad ...(1)$$

Also $$C \subset A \Rightarrow \overline{C} \subset \overline{A} \text{ and } D \subset B \Rightarrow \overline{D} \subset \overline{B} \quad ...(2)$$

It follows from (1) and (2) that

$$C \cap \overline{D} = \varnothing \text{ and } \overline{C} \cap D = \varnothing$$

Hence C and D are separated.

(2) Show that the space (R, U) and (R, S) are Hausdorff.

Solution: Let a, b be any two distinct points of R so that $a \neq b$ and let $|a-b| = \varepsilon$. Then

$$]a-\varepsilon/3, a+\varepsilon/3[\text{ and }]b-\varepsilon/3, b+\varepsilon/3[$$

are disjoint U-nhds of a and b respectively.

Also $[a-\varepsilon/3, a+\varepsilon/3[$ and $[b-\varepsilon/3, b+\varepsilon/3[$ are disjoint S-nhds of a and b respectively.

Hence (R, U) and (R, S) are both Hausdorff.

Question 4: **[10 marks]**

(1) Let (Y, τ_Y) be a subspace of a topological space (X, τ) and $A \subset Y$. Prove that A is τ-disconnected if and only if it is τ_Y-disconnected.

Proof: By **theorem (1)**, two non-empty subsets of Y are $\mathfrak{I}$-separated iff they are $\mathfrak{I}_Y$-separated. Therefore A is the union of two $\mathfrak{I}$-separated sets *iff* it is the union of two $\mathfrak{I}_Y$-separated sets. Hence the result.

(2) Let Y be a subspace of a topological space X and let $A \subset Y$. Prove that A is compact relative to X if and only if A is compact relative to Y.

Proof: Let A be compact relative to X and let $\{V_\lambda : \lambda \in \Lambda\}$ be a collection of sets, open relative to Y, which covers A so that $A \subset \cup\{V_\lambda : \lambda \in \Lambda\}$. Then there exists G_λ, open relative to X, such that $V_\lambda = Y \cap G_\lambda$ for every $\lambda \in \Lambda$. It then follows that

$$A \subset \cup\{G_\lambda : \lambda \in \Lambda\}$$

So that $\{G_\lambda : \lambda \in \Lambda\}$ is an open cover of A relative to X. Since A is compact relative to X, there exists finitely many indices $\lambda_1, \ldots \lambda_n$ such that

$$A \subset G_{\lambda 1} \cup G_{\lambda 2} \ldots\ldots \cup G_{\lambda_n}$$

Since $A \subset Y$, we have

$$A \subset Y \cap [G_{\lambda_1} \cup G_{\lambda 2} \ldots\ldots \cup G_{\lambda_n}] = (Y \cap G_{\lambda_1}) \cup \ldots\ldots \cup (Y \cap G_{\lambda_n}) \quad \text{[Distributive law]}$$

Since $Y \cap G_{\lambda_i} = V_{\lambda_i} (i = 1, 2, \ldots, n)$ we obtain

$$A \subset V_{\lambda_1} \cup \ldots \cup V_{\lambda_n}$$

This show that A is compact relative to Y.

Conversely, let A be compact relative to Y and let $\{G_\lambda : \lambda \in \Lambda\}$ be a collection of open subsets of X which cover A so that

$$A \subset \cup\{G_\lambda : \lambda \in \Lambda\} \quad \ldots(1)$$

Since $A \subset Y$, (1) implies that

$$A \subset Y \cap [\cup\{G_{\lambda_1} : \lambda \in \Lambda\} [= \cup\{Y \cap G_\lambda : \lambda \in \Lambda\} \quad \text{[Distributive law]}$$

Since $Y \cap G_\lambda$ is open relative to Y, the collection

$$(Y \cap G_\lambda : \lambda \in \Lambda\}$$

is an open cover of A relative to Y. Since A is compact relative to Y, we must have

$$A \subset (Y \cap G_{\lambda_1}) \cup \ldots \cup (Y \cap G_{\lambda_n}) \quad \ldots(2)$$

for some choice of finitely many indices, $\lambda_1, \ldots, \lambda_n$. But (2) implies that

$$A \subset G_{\lambda_1} \cup \ldots \cup G_{\lambda_n}$$

If follows that A is compact relative to X.

جامعة المجمعة

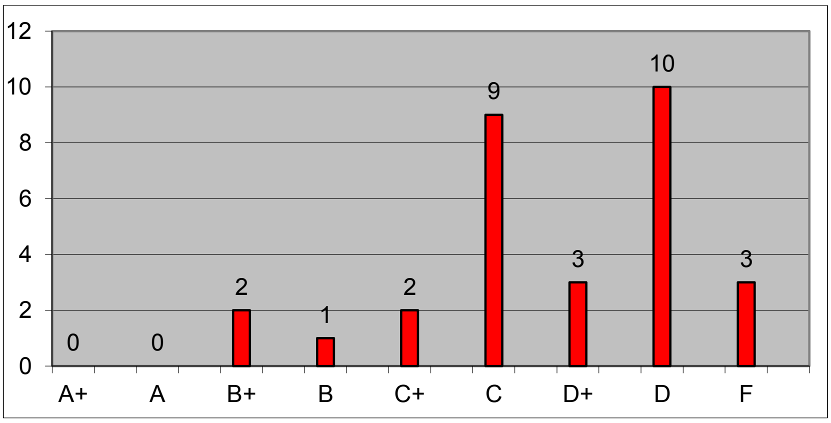
كلية العلوم بالزلفي

نموذج تحويل العلامات النهائي من مئوي الى أحرف لطلبة البكالوريوس

الفصل الدراسي الثاني ١٤٣٥/١٤٣٤

القسم	قسم الرياضيات	رقم المادة	MATH 471
استاذ المادة	د. عبدالناصر غريب عبدالرحمن	اســـم المـــادة	مقدمة فى التوبولوجيا
عدد الطلبة المسجلين	30	عدد الطلبة الغائبين عن النهائي	0
عدد الطلبة الناجحين	25	عدد الطلبة الراسبين	5
متوسط الدرجات	2.58	العلامة الدنيا	F
الدرجة العليا	A+	نسبة النجاح	83.33%

Average	Percentage	SUM	Count	TO	From	Average
	0	0	0	100	95	A+
	0	0	0	94	90	A
	6.66666667	9	2	89	85	B+
	3.33333333	4	1	84	80	B
	6.66666667	7	2	79	75	C+
	30	27	9	74	70	C
	10	7.5	3	69	65	D+
	33.3333333	20	10	64	60	D
	10	3	3	59	0	F
2.58	**100**	**77.5**	**30**		Total Students	



الرقم	العلامة	التقدير
1	60	D
2	71	C
3	45	F
4	70	C
5	61	D
6	60	D
7	85	B+
8	60	D
9	60	D
10	62	D
11	70	C
12	70	C
13	70	C
14	86	B+
15	65	D+
16	60	D
17	60	D
18	84	B
19	70	C
20	46	F
21	72	C
22	65	D+
23	65	D+
24	75	C+
25	71	C
26	43	F
27	60	D
28	75	C+
29	70	C
30	61	D

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Student Course Evaluation Form

The purpose of this evaluation is to collect instructor feedback for improving this course and the Mathematics program. Information will also be used for program accreditation purposes.

I. **Program Learning Outcomes Evaluations**

Course Number/Name	Math 471 Introduction to Topology	Semester	Second 1434/1435
Instructor	**Dr. Abd El-Nasser Ghareeb**		
Student Name	------------------------------------	**Student ID**	----------------------

The course listed above is designed for students to achieve the following outcomes at a Not At All, Low, Low- Medium, Medium, Medium-High or High level.

Please mark (or type) High (5), Medium-High (4), Medium (3), Low-Medium (2), Low (1) or Not At All (0) indicating the level to which you believe, as an instructor, the students have achieved these outcomes in this course.

Program Learning Outcomes	5	4	3	2	1	0
a1. Apply fundamentals and concepts of mathematics.						
a2. Apply fundamentals and concepts General sciences and Computer skills.						
a3. Realize Social and ethical values.						
b1. Read and construct mathematical arguments and proofs.						
b2. Apply critical thinking skills to solve problems that can be modeled mathematically.						
c1. Work independently and within a team						
c2. Bear responsibility for different situations.						
c3. Realize codes of ethics and their importance.						
d1. Communicate a depth and breadth of mathematical knowledge, both orally and in writing.						
d2. Ability to Organize, connect and communicate mathematical and algorithmic ideas.						
d3. Critically interpret numerical and graphical data.						
e1. Use computer and its applications as an office tool						

II. Catalog Description , and Course Prerequisites Evaluations:

Based on your experiences in the course, please respond by circling the most appropriate number. Circle N/A for items that are not applicable, or if you have no opinion.

Catalog Description 1434-1435	• Topological Spaces and examples. • closure of a set and derived set. • Topological subspaces. • Bases, finite product topology and subbases. • Metric spaces, examples and metrizability. • Continuous functions and characterization of continuous functions and homeomorphisms. • Topological property. • Compact spaces. • Limit point and sequentially compact spaces.						
Course Prerequisites:	PMTH 112 + PMTH127	**Circle One (5=Strongly Agree; 1=Strongly disagree)**					
2a. Do you believe that the catalog description (above) is accurate for this course?		**5**	**4**	**3**	**2**	**1**	**N/A**
2b. Do you believe that the course prerequisites (above) are appropriate for this course?		**5**	**4**	**3**	**2**	**1**	**N/A**
2c. If not, please list any prerequisites you believe are not appropriate for this course.							

III. Textbook(s) and/or Lab Manuals (if applicable) Evaluations:

Textbook(s) and/or Lab Manuals (if applicable):	• James Munkers: Topology : A first Course, Prentice Hall, 1975. • S. Willard: General Topology, Reading M A, 1970. • D. Goshi: Introduction to General Topology, New Delhi 1986.	**Circle One (5=Strongly Agree; 1=Strongly Disagree)**					
3a. In general, do you believe this to be an appropriate textbook for this course?		**5**	**4**	**3**	**2**	**1**	**N/A**
3b. Was the organization of the textbook appropriate for this course?		**5**	**4**	**3**	**2**	**1**	**N/A**
3c. Was the level of the textbook appropriate for this course?		**5**	**4**	**3**	**2**	**1**	**N/A**

IV. Computer usage (if applicable) Evaluations:

Computer usage (if applicable):		**Circle One (5=Strongly Agree; 1=Strongly Disagree)**					
4a. Was the use of computer well integrated with the course?		**5**	**4**	**3**	**2**	**1**	**N/A**
4b. Was the computer lab adequately equipped with well-maintained and updated computers?		**5**	**4**	**3**	**2**	**1**	**N/A**
4c. Was the computer lab equipped with sufficient number of computers?		**5**	**5**	**5**	**2**	**1**	**N/A**
4d. Were the special software packages (MATLAB,		**5**	**4**	**3**	**2**	**1**	**N/A**

SPSS, C+, FORTRAN, etc) available and accessible?						
4e. Was adequate technical support available when needed?	**5**	**4**	**3**	**2**	**1**	**N/A**