Course Name : **Nutraceuticals and Functional Foods**

Course Code : **ESU 009**

Course Instructor : **Mr. Rahul Thory**

Hours: 3 **Credits: 3**

Course Description:

This course will review major aspects of functional foods. This course enables the student to understand various functional foods and nutraceuticals and their health benefits. The area of functional foods and nutraceuticals is growing worldwide and has emerged as a major trend in the food and nutrition industry. Areas of study will include the scientific basis for bioactive components of functional foods and nutraceuticals, their sources, chemistry, process technology, safety and regulation.

Course Content:

Unit-A: Nutraceuticals and their health benefits

Nature type &scope of nutraceutical & functional foods, Nutraceutical & functional food applications and there health benefits, Classification of nutraceutical compounds, Nutraceutical for special situation such as cancer, heart disease, stress, osteoporosis, hypertension etc.

Unit-B: Antioxidants and other phytochemicals

Antioxidants and other phytochemicals there role as nutraceuticals & functional foods, Dietary fibers and complex carbohydrates as functional foods, Protein as functional foods, Probiotic foods and there functional role, Herbs as functional food

Unit-C: Various functional foods

Cereals products as functional foods, Functional vegetable products, Oilseed and seafood as functional foods, Coffee, tea and other beverage as functional foods

Unit-D: Effect of various factors on potential of such foods

Effect of processing, storage and interaction of various environmental factors on the potentials of such foods, Marketing and regulatory issues for nutraceutical & functional foods, Recent developments and advances in the area of nutraceutical & functional foods

Course Outcome:

1. Knowledge Outcome:

At the end of the course, the student should be able to:

- Explain various functions of nutraceuticals and functional foods, through in-class discussions, electronic simulations and exam questions.
- Communicate clearly about different type of nutraceuticals and functional foods and there health benefits, through independent written assignments and exam questions.
- Appreciate the contributions of function foods and nutraceuticals in prevention of diseases, through clicker questions, class discussion and exam questions.
- Understand fundamental concepts and knowledge related to functional food and nutraceuticals
- Critically analyze the health benefits of functional foods and nutraceuticals, identifying strengths, limitations and future directions. in-class discussions, clicker questions and exam questions.
- Formulate solutions for various health problems by the use of functional foods and nutraceuticals, through clicker questions, in-class discussions and exam questions.

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2. Skill Outcome:

At the end of the course, the student should be able to:

- Examine and assess the latest development in nutraceuticals research.
- To apply the learned knowledge and develop functional foods for market

Methodology:

- 45 participative lectures to set in conceptual clarity
- 8 Assignments
- 3 Quizzes
- Anything that is relevant for the course

Grading:

Internal Assessment - 50%

- Assignments 8%
- Quizzes/Surprise Tests 7%
- Attendance 5%
- Practical/Project/Seminar etc 6%
- 1st Mid-term exam 12%
- 2nd Mid-term exam 12%

End Term Exam - 50%

Required Books and Materials:

TEXT BOOK:

- Mazza. G (1988), Functional foods – biochemical and processing aspects, technomic Publ. Lancaster USA.
- Wildman, REC (2007), Handbook of nutraceutical & functional foods.

REFERENCE BOOK:

1. Official methods of analysis (2003), Association of official analytical chemist, USA
2. Kirk, RS (1999), Pearson's composition and analysis of foods. Wesley Longman Inc. California, USA.

Lecture Schedule for ESU 009: Nutraceuticals and Functional Foods

Lecture: 1	
Pedagogy	• Power point presentation and class interaction with students • Practical examples
Topics to be covered	• Introduction and definitions of nutraceutical & functional foods
Learning Outcome	• Understanding the nutraceuticals and functional foods

Readings	• Nutraceuticals and functional foods. Robert E.C. Wildman and Mike Kelley. Page 1-8 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "Nature and types of nutraceutical and functional foods" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Page 1-8

Lecture: 2	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Nature of nutraceutical & functional foods • Types of nutraceuticals & functional foods
Learning Outcome	• Understanding nature and types of functional foods and nutraceuticals.
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Page 1-8 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	Surprise Test
Instructions for Next lecture	Students are required to read "Scopes of nutraceutical and functional foods" from Reference material/class notes (RM/CN)

Lecture: 3	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Scopes of nutraceuticals & functional foods

Learning Outcome	• Understanding scope of nutraceuticals & functional foods
Readings	• Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "Nutraceuticals & functional foods applications and there health benefits" from http://www.chiro.org/nutrition/FULL/Functional_Foods.shtml

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Tutorial: 1	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	Practical Question based on: • Introduction and definitions of nutraceutical & functional foods • Nature and types of nutraceutical & functional foods • Scopes of nutraceuticals & functional foods
Learning Outcome	• Students will be able to understand nutraceuticals and functional foods
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Page 1-8 • Reference material/class notes (RM/CN)
Case Study/Practical	Problems from text, reference and anywhere else

Lecture: 4	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Nutraceuticals & functional foods applications and there health benefits
Learning Outcome	• Understanding various nutraceuticals & functional foods

	applications and there health benefits
Readings	• Reference material/class notes (RM/CN) • http://www.chiro.org/nutrition/FULL/Functional_Foods.shtml
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "Nutraceutical compounds" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. page 6-20.

Lecture: 5	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Nutraceuticals compounds
Learning Outcome	• Keen understanding of various nutraceuticals compounds
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. page 6-20 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "classifications of nutraceuticals" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 6-20.

Lecture: 6	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Classification of nutraceuticals compounds based on chemical and biochemical nature with suitable and relevant

	description
Learning Outcome	• Understanding various nutraceuticals compound on the basis of chemical and biochemical nature
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 6-20 • Reference material/class notes (RM/CN)
Case Study/Practical	**----------**
Assignment/Quiz/Project	**Assignment 1 to be announced**
Instructions for Next lecture	Students are required to read "Classification of nutraceuticals" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 6-20.

Tutorial: 2	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker.
Topic to be covered	Practical Question based on: • Nutraceuticals & functional foods applications and there health benefits • Classification of nutraceuticals compounds based on chemical and biochemical nature
Learning Outcome	• Will be able to practically use the concepts.
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. page 6-20 • Reference material/class notes (RM/CN)
Case Study/Practical	• Problems from text, reference and anywhere else

Lecture: 7	
Pedagogy	• Power point presentation and class interaction with students • Practical examples

	• White board and marker
Topics to be covered	• Classification of nutraceuticals compounds isoprenoids derivatives
Learning Outcome	• Understanding classification of nutraceuticals compounds isoprenoids derivatives
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 6-20 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "classification of nutraceutical compounds" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 6-20.

Lecture: 8	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Classification of nutraceuticals compounds phenolic and carbohydrates
Learning Outcome	• Understanding the classification of nutraceuticals compounds Phenolic and carbohydrates
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 6-20 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	Surprise test
Instructions for Next lecture	Students are required to read "classifications of nutraceuticals" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 6-20.

Lecture: 9	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Classification of nutraceuticals compounds fatty acid and amino acid based
Learning Outcome	• Keen understanding classification of nutraceuticals compounds fatty acid and amino acid based
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 6-20 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	Written Test
Instructions for Next lecture	Students are required to read "classifications of nutraceuticals" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 6-20

Tutorial: 3	
Pedagogy	• Practical examples • White board and marker
Topics to be covered	Practical Question based on: • Classifications of nutraceuticals
Learning Outcome	• Students will be able to apply the concept
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. pages 6-20 • Reference material/class notes (RM/CN)
Case Study/Practical	Solution to the problems

Lecture: 10	

Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Classification of nutraceuticals compounds microbes and minerals
Learning Outcome	• Understanding the Classification of nutraceuticals compounds microbes and minerals
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 6-20 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "Nutraceuticals for special situation" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 79-83

Lecture: 11	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Nutraceuticals for special situation such as cancer
Learning Outcome	• Understanding nutraceuticals for special situation such as cancer
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 79-83 • Reference material/class notes (RM/CN
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "nutraceuticals for special situations" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 131-142.

Lecture: 12	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Nutraceuticals for special situation such as coronary heart disease
Learning Outcome	• Understanding nutraceuticals for special situation such as coronary heart disease
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 131-142 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "nutraceuticals for special situations" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 247-259.

Tutorial: 4	
Pedagogy	• White board • Practical examples
Topics to be covered	Practical Question based on: • Classifications of nutraceuticals • Nutraceuticals for special situations
Learning Outcome	• Students will be able to know about nutraceuticals for special situations
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 6-20, 79-83, 131-142 • Reference material/class notes (RM/CN)
Case Study/Practical	Practical problems

Lecture: 13	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Nutraceuticals for special situation such as stress, osteoporosis and hypertension
Learning Outcome	• Keen understanding nutraceuticals for special situation such as stress, osteoporosis and hypertension
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 247-259 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "antioxidants and other phytochemicals" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Page 1-8

Lecture: 14	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Antioxidants and other phytochemicals.
Learning Outcome	• Keen understanding of various antioxidants and other phytochemicals
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Page 1-8 • Reference material/class notes (RM/CN))
Case Study/Practical	----------

Assignment/Quiz/Project	**Assignment II to be announced**
Instructions for Next lecture	Students are required to read "various phytochemicals" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 23-45.

Lecture: 15	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Phytochemicals (isoflavones, etc)
Learning Outcome	• To learn various Phytochemicals (isoflavones, lycopene etc)
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 23-45 • Reference material/class notes (RM/CN)
Case Study/Practical	**----------**
Assignment/Quiz/Project	**----------**
Instructions for Next lecture	Students are required to read "role of antioxidants as nutraceuticals and functional foods" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 166-185.

Tutorial: 5	
Pedagogy	• Power point presentation and class interaction with students • Practical examples
Topic to be covered	Practical Question based on: • Nutraceuticals for special situation • Antioxidants and other phytochemicals
Learning Outcome	• Students will be able to understand nutraceuticals for special situation and various antioxidants and other phtochemicals
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 1-8, 23-45, 247-259

	• Reference material/class notes (RM/CN)
Case Study/Practical	Practical questions in class

Lecture: 16	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Role of antioxidants as nutraceuticals & functional foods
Learning Outcome	• Understand the role of antioxidants as nutraceuticals & functional foods
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 166-185 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "role of phytochemicals as nutraceuticals and functional foods" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 23-45.

Lecture: 17	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Role of phytochemicals as nutraceuticals & functional foods
Learning Outcome	• To learn role of phytochemicals as nutraceuticals & functional foods.
Readings	• Wildman, REC (2007), handbook of nutraceuticals and

	functional foods. Pages 23-45 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	Surprise quiz
Instructions for Next lecture	Students are required to read "dietary fibre as functional foods" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Page 131-142.

Lecture: 18	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Dietary fibers as functional foods
Learning Outcome	• To understand dietary fibers as functional foods
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Page 131-142 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "complex carbohydrates as functional foods" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 131-142.

Tutorial: 6	
Pedagogy	Interaction with students
Topics to be covered	Practical Question based on: • Role of antioxidants as nutraceuticals & functional foods • Role of phytochemicals as nutraceuticals & functional foods • Dietary fiber as functional foods

Learning Outcome	• Students will be able to understand antioxidants, phytochemicals and dietary fiber as functional foods
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 23-45, 131-142 and 166-185 • Reference material/class notes (RM/CN)
Case Study/Practical	Practical questions in class

Lecture: 19	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Complex carbohydrates as functional foods
Learning Outcome	• To understand complex carbohydrates as functional foods
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 131-142 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	Regular Test
Instructions for Next lecture	Students are required to read "protein as functional foods" from Jennifer, SE., Wildman, REC., Donald, LK (2007), proteins as functional foods ingredients for weight loss and maintaining body composition. Handbook of nutraceuticals and functional foods. Pages 391-408.

Lecture: 20	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Protein as functional food ingredients

Learning Outcome	• To understand Protein as functional food ingredients
Readings	• Jennifer, SE., Wildman, REC., Donald, LK (2007), proteins as functional foods ingredients for weight loss and maintaining body composition. Handbook of nutraceuticals and functional foods. Pages 391-408 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "Probiotic foods" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 335-352.

Lecture: 21	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Probiotic foods and their types
Learning Outcome	• Knowledge about probiotic foods and their types
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 335-352 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "functional role of probiotics" from Probiotics: Nature's internal healers by Natasha Trinev and Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 335-352

Tutorial: 7	
Pedagogy	• Practical examples • White board and marker

Topics to be covered	Practical Question based on: • Complex carbohydrates as functional foods • Proteins as functional foods • Probiotics foods and there types
Learning Outcome	Students will be able to know about complex carbohydrates, protein and probiotics foods
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 131-142, 335-352 • Jennifer, SE., Wildman, REC., Donald, LK (2007), proteins as functional foods ingredients for weight loss and maintaining body composition. Handbook of nutraceuticals and functional foods. Pages 391-408 • Reference material/class notes (RM/CN)
Case Study/Practical	Practical questions in class

Lecture: 22	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Functional role of probiotic foods
Learning Outcome	• Knowledge functional role of probiotic foods
Readings	• Probiotics: Nature's internal healers by Natasha Trinev • Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 335-352 • Reference material/class notes (RM/CN)
Case Study/Practical	**----------**
Assignment/Quiz/Project	**Assignment III to be announced**
Instructions for Next lecture	Students are required to read "herbs as functional supplements" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 269-284.

Lecture: 23	
Pedagogy	• Power point presentation and class interaction with

	students • Practical examples • White board and marker
Topics to be covered	• Herbs as functional supplements
Learning Outcome	• To understand herbs as functional supplements
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 269-284 • Reference material/class notes
Case Study/Practical	**----------**
Assignment/Quiz/Project	Surprise Test
Instructions for Next lecture	Students are required to read "health promoting activity of common herbs" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 269-284.

Lecture: 24	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Health promoting activity of common herbs
Learning Outcome	• To understand health promoting activity of common herbs.
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 269-284 • Reference material/class notes (RM/CN)
Case Study/Practical	**----------**
Assignment/Quiz/Project	**Assignment IV to be announced**
Instructions for Next lecture	Students are required to read "Prebiotics and their role" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 335-352.

Tutorial: 8	

Pedagogy	Interaction with students on: 1. Functional role of probiotic foods 2. Herbs as functional supplements 3. Health promoting activity of common herbs
Topics to be covered	Practical Question based on: • Functional role of probiotic foods • Herbs as functional supplements • Health promoting activity of common herbs
Learning Outcome	Students will be able to understand above risks
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 269-284, 335-352 • Reference material/class notes (RM/CN)
Case Study/Practical	Read about herbs

Lecture: 25	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Prebiotics and their role
Learning Outcome	• Understanding Prebiotics and their role
Readings	• Probiotics: Nature's internal healers by Natasha Trinev • Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 335-352 • Reference material/class notes (RM/CN)
Case Study/Practical	**----------**
Assignment/Quiz/Project	**----------**
Instructions for Next lecture	Students are required to read "cereal products as functional foods" from Mazza. G (1988), Functional foods – biochemical and processing aspects, technomic Publ. Lancaster USA. 1-38.

Lecture: 26	

Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Cereal products as functional foods-oats.
Learning Outcome	• Understanding cereal products as functional foods-oats
Readings	• Mazza. G (1988), Functional foods – biochemical and processing aspects, technomic Publ. Lancaster USA. 1-38 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "cereal products as functional foods" from Mazza. G (1988), Functional foods – biochemical and processing aspects, technomic Publ. Lancaster USA. 1-38

Lecture: 27	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Cereal products as functional foods- wheat bran, rice bran etc.
Learning Outcome	• Understanding cereal products as functional foods- wheat bran, rice bran etc.
Readings	• Mazza. G (1988), Functional foods – biochemical and processing aspects, technomic Publ. Lancaster USA. 1-38 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------

Instructions for Next lecture	Students are required to read "coffee as functional foods" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 453-464.

Tutorial: 9	
Pedagogy	• Power Point and White Board • Solving of problems in class
Topics to be covered	Practical Question based on: • Prebiotics as functional foods • Cereal products as functional foods
Learning Outcome	• Students will be able to understand cereal products as functional foods
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 335-352 • Mazza. G (1988), Functional foods – biochemical and processing aspects, technomic Publ. Lancaster USA. 1-38 • Reference material/class notes (RM/CN)
Case Study/Practical	Problems given in text, reference and elsewhere

Lecture: 28	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Coffee as functional food beverage/drinks
Learning Outcome	• Students will be able to understand coffee as functional food beverage/drinks
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 453-464 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	Surprise quiz
Instructions for Next lecture	Students are required to read "tea as functional foods" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 453-464

Lecture: 29	

Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Tea as functional food beverage/drinks
Learning Outcome	• Understanding tea as functional food beverage/drinks
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 453-464 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "other beverages as functional foods" from Biotechnology: food fermentation, microbiology, biochemistry and technology, Eds. Joshi, V.K. & Panday, A

Lecture: 30	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Other beverage (wines) as functional foods/drinks.
Learning Outcome	• To understand other beverage (wines) as functional foods/drinks
Readings	• Biotechnology: food fermentation, microbiology, biochemistry and technology, Eds. Joshi, V.K. & Panday, A • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	Regular Test
Instructions for Next lecture	Students are required to read "olive oil and its health benefits" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 297-308

Tutorial: 10	
Pedagogy	• Power Point and White Board • Solving of problems in class
Topics to be covered	Practical Question based on: • Coffee as functional food beverage/drinks • Tea as functional food beverage/drinks • Other beverages as functional food beverage/drinks
Learning Outcome	• Students will be able to understand various beverages as functional foods
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 453-464 • Biotechnology: food fermentation, microbiology, biochemistry and technology, Eds. Joshi, V.K. & Panday, A • Reference material/class notes (RM/CN)
Case Study/Practical	Problems given in text, reference and elsewhere

Lecture: 31	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Olive oil and its health benefits as nutraceuticals
Learning Outcome	• Students will be able to know olive oil and health benefits as nutraceuticals
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 297-308 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	• Surprise Quiz
Instructions for Next lecture	Students are required to read "coffee, tea and their protective effects" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 453-464.

Lecture: 32	
Pedagogy	• Power point presentation and class interaction with students

	• Practical examples • White board and marker
Topics to be covered	• Coffee, tea and their protective effects
Learning Outcome	• Knowledge about coffee, tea and their protective effects
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 453-464 • Reference material/class notes (RM/CN)
Case Study/Practical	**----------**
Assignment/Quiz/Project	**Assignment V to be announced**
Instructions for Next lecture	Students are required to read "effect of processing on nutraceutical compounds" from Mazza. G (1988), Functional foods- biochemical and processing aspects, technomic publ. Lancaster USA

Lecture: 33	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Effect of processing on nutraceuticals compounds
Learning Outcome	• To learn about effect of processing on nutraceuticals compounds
Readings	• Mazza. G (1988), Functional foods- biochemical and processing aspects, technomic publ. Lancaster USA • Reference material/class notes (RM/CN)
Case Study/Practical	**----------**
Assignment/Quiz/Project	Surprise Test
Instructions for Next lecture	Students are required to read "effect of storage on nutraceutical compounds" from Mazza. G (1988), Functional foods- biochemical and processing aspects, technomic publ. Lancaster USA

Tutorial: 11	
Pedagogy	• Power Point and White Board

	• Solving of problems in class
Topics to be covered	Practical Question based on: • Olive oil and its health benefits as nutraceuticals • Coffee, tea and their protective effects • Effect of processing on nutraceuticals compounds
Learning Outcome	• Students will be able to understand health benefits of various compounds and effect of processing on nutraceutical compounds
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 297-308, 453-464 • Mazza. G (1988), Functional foods- biochemical and processing aspects, technomic publ. Lancaster USA • Reference material/class notes (RM/CN)
Case Study/Practical	Problems given in text, reference and

Lecture: 34	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Effect of storage on nutraceutical compounds
Learning Outcome	• Students will understand Effect of storage on nutraceutical compounds
Readings	• Mazza. G (1988), Functional foods- biochemical and processing aspects, technomic publ. Lancaster USA • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	Surprise Test
Instructions for Next lecture	Students are required to read "Interaction of various environmental factors on the potential of such foods" from Mazza. G (1988), Functional foods- biochemical and processing aspects, technomic publ. Lancaster USA

Lecture: 35	
Pedagogy	• Power point presentation and class interaction with students

	• Practical examples • White board and marker
Topics to be covered	• Interaction of various environmental factors on the potential of such foods
Learning Outcome	• Students will Interaction of various environmental factors on the potential of such foods
Readings	• Mazza. G (1988), Functional foods- biochemical and processing aspects, technomic publ. Lancaster USA • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	**Assignment VI to be announced**
Instructions for Next lecture	Students are required to read "Nutraceuticals stability concerns and shelf life testing" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 461-487.

Lecture: 36	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Nutraceuticals stability concerns
Learning Outcome	• Students will understand nutraceuticals stability concerns
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 461-487 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "Nutraceuticals shelf life testing" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 461-487.

Tutorial: 12	
Pedagogy	• Power Point and White Board • Solving of problems
Topics to be covered	Practical Question based on: • Effect of storage on nutraceutical compounds • Interaction of various environmental factors on the potential of such foods • Nutraceuticals stability concerns
Learning Outcome	• Students will be able to understand effects of various factor on potential of such foods
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 461-487 • Reference material/class notes (RM/CN)
Case Study/Practical	Problems given in text, reference and elsewhere

Lecture: 37	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Nutraceuticals shelf life testing
Learning Outcome	• Students will understand nutraceuticals shelf life testing
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 461-487 • Reference material/class notes (RM/CN)
Case Study/Practical	**----------**
Assignment/Quiz/Project	**----------**
Instructions for Next lecture	Students are required to read "Marketing issues for nutraceuticals" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 503-514

Lecture: 38	
Pedagogy	• Power point presentation and class interaction with students

	• Practical examples • White board and marker
Topics to be covered	• Marketing issues for nutraceuticals
Learning Outcome	• Students will understand marketing issues for nutraceuticals and functional foods
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 503-514 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "Marketing issues for functional foods" from Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 503-514

Lecture: 39	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Marketing issues for functional foods
Learning Outcome	• Students will understand marketing issues for nutraceuticals and functional foods
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 503-514 • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "Regulatory issues of Nutraceuticals" from http://ajcn.nutrition.org/content/79/6/1217S.full

Tutorial: 13	
Pedagogy	• Power Point and White Board • Solving of problems
Topics to be covered	Practical Question based on: • Nutraceuticals shelf life testing • Marketing issues for nutraceuticals

	• Marketing issues for functional foods
Learning Outcome	• Students will be able to understand marketing issues for nutraceuticals
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. Pages 503-514 • Reference material/class notes (RM/CN)
Case Study/Practical	Problems given in text, reference and elsewhere

Lecture: 40	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Regulatory issues for nutraceuticals
Learning Outcome	• Students will understand regulatory issues for nutraceuticals and functional foods
Readings	• http://ajcn.nutrition.org/content/79/6/1217S.full • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "Regulatory issues for functional foods" from http://ajcn.nutrition.org/content/79/6/1217S.full

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Lecture: 41	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Regulatory issues for functional foods
Learning Outcome	• Students will understand regulatory issues for nutraceuticals and functional foods
Readings	• http://ajcn.nutrition.org/content/79/6/1217S.full • Reference material/class notes (RM/CN)

Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "Recent developments in the area of nutraceuticals" from Wildman, REC (2007), handbook of nutraceuticals and functional foods

Lecture: 42	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Recent developments in the area of nutraceuticals
Learning Outcome	• Students will understand recent developments in the area of nutraceuticals and functional foods
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	**Assignment VII to be announced**
Instructions for Next lecture	Students are required to read "Recent developments in the area of functional foods" from Wildman, REC (2007), handbook of nutraceuticals and functional foods

Tutorial: 14	
Pedagogy	• Power Point and White Board • Solving of problems
Topics to be covered	Practical Question based on: • Regulatory issues for nutraceuticals and functional foods • Recent developments in the area of nutraceuticals
Learning Outcome	• Students will be able to understand regulatory issues for nutraceuticals and functional foods
Readings	• Reference material/class notes (RM/CN) • Wildman, REC (2007), handbook of nutraceuticals and functional foods.
Case Study/Practical	• Problems given in text, reference and elsewhere

Lecture: 43	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Recent developments in the area of functional foods
Learning Outcome	• Students will understand recent developments in the area of nutraceuticals and functional foods
Readings	• Wildman, REC (2007), handbook of nutraceuticals and functional foods. • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Students are required to read "Recent advances in the area of Nutraceuticals" from http://www.dairyprocessingcaft.com/wp-content/uploads/2013/03/Recent-Development-in-Health-Foods-and-Nutraceuticals-2005.pdf

Lecture: 44	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Recent advances in the area of nutraceuticals
Learning Outcome	• Students will understand recent advances in the area of nutraceuticals and functional foods
Readings	• http://www.dairyprocessingcaft.com/wp-content/uploads/2013/03/Recent-Development-in-Health-Foods-and-Nutraceuticals-2005.pdf • Wildman, REC (2007), handbook of nutraceuticals and functional foods. • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------

Instructions for Next lecture	Students are required to read "Recent advances in the area of Functional foods" from http://www.dairyprocessingcaft.com/wp-content/uploads/2013/03/Recent-Development-in-Health-Foods-and-Nutraceuticals-2005.pdf

Lecture: 45	
Pedagogy	• Power point presentation and class interaction with students • Practical examples • White board and marker
Topics to be covered	• Recent advances in the area of functional foods
Learning Outcome	• Students will understand recent advances in the area of nutraceuticals and functional foods
Readings	• http://www.dairyprocessingcaft.com/wp-content/uploads/2013/03/Recent-Development-in-Health-Foods-and-Nutraceuticals-2005.pdf • Wildman, REC (2007), handbook of nutraceuticals and functional foods. • Reference material/class notes (RM/CN)
Case Study/Practical	----------
Assignment/Quiz/Project	----------
Instructions for Next lecture	Attempt problems from text, reference and elsewhere

Tutorial: 15	
Pedagogy	Interaction with students on: All topics covered so far
Topics to be covered	• Discussion on all topics covered in the course • Doubt clearing • Solving the problems
Learning Outcome	• Students will clear their doubts • Students will be able to tackle problems
Readings	All relevant pages from text book, reference and class notes
Case Study/Practical	Doubt clearing and Practical problems