For CLE/Pathways course, form can be found here: https://www.pathways.prov.vt.edu/proposal-forms.html

General Information

<table>
<thead>
<tr>
<th>Proposal Date:</th>
<th>3/5/2021</th>
</tr>
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<tbody>
<tr>
<td>Department:</td>
<td>Human Nutrition, Foods, and Exercise</td>
</tr>
<tr>
<td>Course Designator and Number:</td>
<td>HNFE 5184</td>
</tr>
<tr>
<td>Title of Course:</td>
<td>Advanced Macronutrient Metabolism</td>
</tr>
<tr>
<td>Credit Hours:</td>
<td>3</td>
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</tbody>
</table>

Please refer to Office of University Registrar for guidelines and policy requirements https://www.registrar.vt.edu/faculty/teaching/instructional-minutes.html

Please count this course toward the following Scorecard Metrics areas:

- [ ] Study Abroad
- [ ] Service Learning
- [ ] Experiential
- [ ] Undergraduate Research

Scorecard Metrics Definitions can be found here: http://www.registrar.vt.edu/faculty/forms/scorecard-metrics.html

Please insert an X if this course should count toward First Year Experience:

- [ ] First Year Experience (FYE)

For more information see: http://www.fye.vt.edu

Select ONE of the following boxes

- [X] New Course
- [ ] *Revised Course  (Revision > 20% _______  Revision < 20% _______)

For CLE/Pathways course, form can be found here: https://www.pathways.prov.vt.edu/proposal-forms.html

*Please include a summary of course revisions to the Justification section of proposal

A: Attach statement from Dean or Departmental Representative as to whether teaching this course will require or generate the need for additional departmental resources.

B: Attach appropriate letters of support from affected departments and/or colleges.

C: Effective Semester: Fall 2022

D: Change in Title From:

To:

E: Change in Transcript Title (ADP) From:

To:

F: Change in Credit Hours From:

To:

G: Change in Lecture and/or Lab Hours From:

To:

H: Course Number(s) and Title(s) to be deleted from the Catalog with APPROVAL:

Office of the University Registrar • Student Services Building, Suite 250, Virginia Tech
800 Washington St., SW • Blacksburg, VA 24061 • (540) 231-6252 • registrar@vt.edu
Course Information

Catalog Description
Macronutrients sources, interrelationships, and factors affecting utilization, metabolism, physiological, and biochemical function to provide energy. Dietary carbohydrate (simple and complex), fat, and protein metabolism following a meal, during fasting conditions, and during and after exercise or physical activity, for energy generation. Altered metabolism of dietary carbohydrates, fats, proteins, and alcohol in metabolic diseases including obesity and diabetes. Pre: Graduate Standing. (3H, 3C)

Learning Objectives
Having successfully completed this course, the student will be able to:
1. Analyze how the principles of human anatomy and physiology, and biochemistry apply to the metabolism of dietary macronutrients.
2. Classify the principal energy systems of the body and how they function at rest and during exercise to maintain energy balance.
3. Examine the major physiological and biochemical functions of macronutrients in the body in both a fed and fasted state.
4. Explain the principles of physiology in understanding digestion, absorption, transportation, and utilization of macronutrients in a fed state, and the use of stored nutrients in a fasted state in multiple organ systems (e.g. liver, intestines, skeletal muscle, kidneys, and pancreas).
5. Discriminate between the interrelationships between the major macronutrients and their roles in metabolic flexibility and inflexibility.
6. Examine the changes to whole-body metabolism during different types of exercise.
7. Evaluate energy metabolism of macronutrients, their interrelationships with each other and with the micronutrients in a typical western diet.

Justification
An individual’s diet consists primarily of three macronutrients: carbohydrates, fats, and protein (and to a lesser extent- alcohol) that provide our bodies with energy. The biological processes occurring in the body after an individual consumes a meal may vary widely. Excessive energy intake and poor diet quality contribute to significant health risks especially obesity, diabetes, heart disease, and cancer. Health professionals need knowledge about macronutrient metabolism and its effect on the physiology of the human body, to assess popular diets using a whole-body metabolism lens. This course will provide students with fundamental knowledge and skills in evidence-based practice to critically evaluate the scientific literature on human metabolism, and apply this knowledge using case studies for specific diets (i.e., ketogenic, vegetarian, Mediterranean, etc.) and for types of exercise (i.e. aerobic, resistance training, etc.).

This course is taught at the 5000-level because it builds upon general levels of knowledge obtained in undergraduate human physiology and biochemistry courses. Students working independently will demonstrate the ability to critically evaluate original research related to human macronutrient metabolism and use this information to disseminate evidence-based nutritional information.
### Prerequisites and Corequisites

**Pre:** Graduate Standing.

### Texts and Special Teaching Aids

**Required texts:**


### Topic Syllabus

<table>
<thead>
<tr>
<th>Course Topic</th>
<th>Percent of Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy systems and energy balance at rest and during physical activity</td>
<td>5</td>
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<tr>
<td>Overview of the physiological and biochemical functions of macronutrients in a fed and fasted state</td>
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<tr>
<td>Macronutrient metabolism in a fed state:</td>
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<tr>
<td><em>•</em> Digestion and absorption</td>
<td></td>
</tr>
<tr>
<td><em>•</em> Storage and transport of nutrients</td>
<td></td>
</tr>
<tr>
<td><em>•</em> Carbohydrate and fiber metabolism</td>
<td></td>
</tr>
<tr>
<td><em>•</em> Dietary fat and alcohol metabolism</td>
<td></td>
</tr>
<tr>
<td><em>•</em> Protein and amino acid metabolism</td>
<td></td>
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<tr>
<td>Macronutrient metabolism in a fasted state</td>
<td>20</td>
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<tr>
<td>Metabolic flexibility from a fed to fast to fed state</td>
<td>5</td>
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<tr>
<td>Metabolic inflexibility, obesity, and diabetes</td>
<td>5</td>
</tr>
<tr>
<td>Metabolism and exercise</td>
<td>20</td>
</tr>
<tr>
<td>Metabolic adaptations to dietary changes</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

### Old (Current) Topic Syllabus

N/A
May 18, 2021

To: Members of Virginia Tech Governance

I would like to offer our support for the new course, HNFE 5184: Advanced Macronutrient Metabolism. No additional resources are required for this course. The faculty in the Department of Human Nutrition, Foods, and Exercise have unanimously voted in support of offering this course.

Sincerely,

Stella Lucia Volpe