GRADUATE SCHOOL

The following courses, listed alphabetically by department, have been approved for graduate credit. Please see the Interdepartmental (IDPT) section for courses which are taught cooperatively by individual departments.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Prerequisites/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMGN 7650</td>
<td>Research in Biochemistry and Molecular Genetics</td>
<td>Variable</td>
<td>Dr. P. Megee</td>
<td>Consent of instructor. Research work in biochemistry and molecular genetics.</td>
</tr>
<tr>
<td>BMGN 7660</td>
<td>Biochemistry Seminar</td>
<td>1.0</td>
<td>Dr. P. Megee</td>
<td>(Fall, Spring) Seminar series provides a forum for the presentation of scientific experiments and information in biochemistry by faculty, postdoctoral fellows graduate students, and invited outside guest speakers.</td>
</tr>
<tr>
<td>BMGN 8990</td>
<td>Doctoral Thesis</td>
<td>Variable</td>
<td>Dr. P. Megee</td>
<td>(Spring, Summer, Fall) Doctoral thesis work in biochemistry and molecular genetics.</td>
</tr>
<tr>
<td>BIOI 7210</td>
<td>Introduction to Computer Science</td>
<td>3.0</td>
<td>Dr. D. Lezotte</td>
<td>CU-Boulder CSCI 3155 or equivalent. Cross-listed: CU-Boulder CSCI-5582. Overview of artificial intelligence methods, theories and applications. Relationships between artificial intelligence and psychology, linguistics and philosophy. Introduction to artificial intelligence programming.</td>
</tr>
<tr>
<td>BIOI 7410</td>
<td>Introduction to Bayesian Statistics</td>
<td>3.0</td>
<td>Dr. M. Fitzgerald</td>
<td>MATH 3800 or MATH 4810 and MATH 4820 or equivalent. Some computer programming experience or permission of instructor. Cross-listed: MATH 5396. Introduction to Bayesian Statistical Methods. Covers prior and posterior distributions, conjugate models, single and multi parameter models, hierarchical models, mixture models, numerical methods for evaluating posterior distributions, Monte Carlo methods and Markov chain Monte Carlo simulations.</td>
</tr>
<tr>
<td>BIOI 7412</td>
<td>Mathematics for Bioscientists</td>
<td>1.0</td>
<td>Dr. S. Billups</td>
<td>Permission of instructor. Cross-listed: MATH 5198. Develops mathematical reasoning; introduces linear algebra, discrete structures, graph theory, probability, and differential equations using applications to molecular biology.</td>
</tr>
<tr>
<td>BIOI 7601</td>
<td>Selected Topics in Biomedical Science for Bioinformatics Students 1</td>
<td>3.3</td>
<td>Dr. D. Lezotte</td>
<td>Permission of bioinformatics Faculty. Cross-listed: IDPT 7801. Selected topics in structural, cellular and molecular biology chosen from lectures offered in IDPT 7801.</td>
</tr>
<tr>
<td>BIOI 7602</td>
<td>Selected Topics in Biomedical Science for Bioinformatics Students 2</td>
<td>3.3</td>
<td>Dr. D. Lezotte</td>
<td>Permission of bioinformatics Faculty. Cross-listed: IDPT 7802. Selected topics in structural, cellular and molecular biology chosen from lectures offered in IDPT 7802.</td>
</tr>
<tr>
<td>BIOI 7603</td>
<td>Selected Topics in Biomedical Science for Bioinformatics Students 3</td>
<td>3.4</td>
<td>Dr. D. Lezotte</td>
<td>Permission of Bioinformatics Faculty. Cross-listed: IDPT-7803. Selected topics in structural, cellular and molecular biology chosen from lectures offered in IDPT 7803.</td>
</tr>
<tr>
<td>BIOI 7605</td>
<td>Ethics and Values in Computational Bioscience Research</td>
<td>1.0</td>
<td>Dr. M. Yarborough</td>
<td>Computational Bioscience PhD student or permission of instructor. This course will examine the philosophical basis for current research ethics practices, address current ethical issues and controversies in bio-computational research, and provide students with knowledge and analytical skills to address the ethical dimensions of biomedical informatics.</td>
</tr>
<tr>
<td>BIOI 7606</td>
<td>Statistics for the Basic Sciences</td>
<td>3.0</td>
<td>Dr. D. Everett</td>
<td>Cross-listed: BIOS 6606. This course provides an overview of fundamental concepts in statistics such as hypothesis testing and estimation and it provides an overview of statistical methods (for example, regression and analysis of variance) that apply to many areas of science.</td>
</tr>
<tr>
<td>BIOI 7655</td>
<td>Statistical Methods in Genetic Association Studies</td>
<td>3.0</td>
<td>Dr. T. Fingerlin</td>
<td>Cross-listed: BIOS 6655. Prereq: BIOS 6612 or permission of instructor.</td>
</tr>
</tbody>
</table>
This course is designed to give an introduction to statistical methods in genetic association studies. Topics include an introduction to population genetics topics relevant to genetic association studies, design strategies and analysis methods for case-control and family data.

**BIOI 7659 Statistical Methods in Bioinformatics**  2.0 cr.
Dr. K. Kechris (Fall)  Prereq: BIOS 6611 or equivalent graduate level statistics class with consent of instructor.  Cross-listed: BIOS 6659.
This course will give an introduction to statistical methods for analyzing molecular sequences and genomic data. Topics include hidden Markov models for sequence alignment, molecular evolution and gene expression data analysis.

**BIOI 7710 Survey of Bioinformatics Methods**  2.0 cr.
Dr. L. Hunter (Fall)  Prereq: Instructor’s Permission.  Restrictions: No Bioinformatics PhD students can take this course for credit.
What is bioinformatics and why study it? How is large-scale molecular biology data generated, where and how can researchers gain access to it, and what computational analyses are possible?

**BIOI 7711 Bioinformatics I**  4.0 cr.
Dr. L. Hunter (Fall)  Prereq: Bioinformatics PhD student or consent of instructor.  Cross-listed: PHCL 7611.
What is bioinformatics and why study it? How is large-scale molecular biology data generated, where and how can researchers gain access to it, what computational analyses are possible and computational techniques for solving inference problems in molecular biology?

**BIOI 7712 Bioinformatics II**  4.0 cr.
Dr. L. Hunter (Spring)  Prereq: BIOI 7711
Inference problems and computational techniques for molecular biology, with emphasis on machine learning approaches. Use of computational induction techniques focused on information extraction from biomedical literature, inference of biochemical networks from high-throughput data, and prediction of protein function.

**BIOI 7785 Independent Study in Bioinformatics**  1-3 cr.
Dr. D. Lezotte (Fall, Spring, Summer)  Prereq: Consent of instructor.
This course is for the advanced student who desires to pursue one or more bioinformatics-related topics in considerable depth. Supervision by a full-time faculty member is necessary.

**BIOI 7791 Readings in Bioinformatics**  1.0 cr.
Dr. L. Hunter (Fall, Spring, Summer)  Prereq: Consent of instructor.
A seminar course in which students read and present recent publications from the primary bioinformatics literature.

**BIOI 7792 Special Topics in Bioinformatics**  1-3 cr.
Dr. L. Hunter (Fall, Spring, Summer)  Prereq: Consent of instructor.
Special topics course with focus on new emerging Bioinformatics and Computational Biology problems and techniques.

**BIOI 8990 Doctoral Thesis**  1-10 cr.
Dr. D. Lezotte (Fall, Spring, Summer)  Prereq: Consent of instructor.
Doctoral thesis work in Bioinformatics.

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## BIOSTATISTICS

**BIOS 6601 Applied Biostatistics I**  3.0 cr.
Dr. J. Kittelson (Fall, Spring)
An introduction to statistical methods in the health sciences emphasizing the use of statistics to answer research questions. Content includes descriptive and statistical inference; statistical methods include t-tests, chi-square tests, one-way ANOVA, and linear regression. Statistical software is used.

**BIOS 6602 Applied Biostatistics II**  3.0 cr.
Dr. L. Ogden (Spring)  Prereq: BIOS 6601.
A continuation of BIOS 6601 extending the basic principles of descriptive and inferential statistics to modeling more complex relationships using linear regression, logistic regression, Poisson regression, and Cox regression. The statistical package SAS is used extensively.

**BIOS 6606 Statistics for the Basic Sciences**  3.0 cr.
Dr. D. Everett (Spring)  Restrictions: Enrollment in UCD-AMC graduate program or permission of the instructor.
This course provides an overview of fundamental concepts in statistics such as hypothesis testing and estimation, and it provides an overview of statistical methods (for example, regression and analysis of variance) that apply to many areas of science.
BIOS 6607 **Statistics for Pharmacology**  
2.0 cr.  
Dr. D. Everett (Spring)  
This course provides an overview of fundamental concepts in statistics such as hypothesis testing and estimation, and it provides an overview of statistical methods (for example, 1- and 2-sample tests and microarray techniques) that apply to pharmacology.

BIOS 6611 **Biostatistical Methods I**  
3.0 cr.  
Dr. M. Strand (Fall)  
This is a first course in applied statistics covering elementary probability, descriptive, parametric and non-parametric methods for one and two sample estimation/testing and some common simple cases of the univariate general linear model. The statistical package SAS used extensively.

BIOS 6612 **Biostatistical Methods II**  
3.0 cr.  
Dr. L. Ogden (Spring)  
This is a continuation of BIOS 6611 covering univariate linear modeling and emphasizing multiple regression analysis and variance. Logistic regression and methods for correlated data are also covered. Matrix algebra and the statistical package SAS will be used.

BIOS 6621 **Statistical Consulting**  
1.0 cr.  
Dr. G. Grunwald (Fall, Spring, Summer)  
Students will gain experience with statistical consulting and common statistical problems and techniques encountered in consulting through a combination of real examples and consultations with investigators. Under faculty supervision, advanced students will work on consulting projects with investigators.

BIOS 6631 **Statistical Theory I**  
3.0 cr.  
Dr. M. Strand (Fall)  
This course presents an introductory coverage of the theory of discrete and continuous random variables and applications to statistical problems. Topics include probability theory, transformations and expectations, common families of distributions, multiple random variables, and properties of a random sample.

BIOS 6632 **Statistical Theory II**  
3.0 cr.  
Dr. S. MaWhinney (Spring)  
This course covers theoretical and applied fundamentals of statistical inference. The course is a continuation of BIOS 6631. The primary topics include point estimation, hypothesis testing, interval estimation and asymptotic methods.

BIOS 6646 **Survival Analysis**  
2.0 cr.  
Dr. A. Barón (Spring)  
This course covers the analysis of time-to-event data with applications to biology, medicine, and public health. Nonparametric methods for group comparisons and semi-parametric regression models will be emphasized. Parametric methods and distribution theory for survival analysis will also be included.

BIOS 6648 **Design of Clinical Trials**  
2.0 cr.  
Dr. J. Kittelson (Spring)  
The design and conduct of human intervention trials. Specific topics include: specifying the research question, study endpoints, study populations, study treatments, sample size evaluation, and choice of control groups. Common trial designs and the role of statisticians in trials monitoring are described.

BIOS 6649 **Statistical Methods for Clinical Trials**  
1.0 cr.  
Dr. J. Kittelson (Spring)  
This course is a companion to BIOS 6648 that focuses on statistical issues in the design and analysis of clinical trials including sample size calculations, trials with repeated measurements, and the statistical aspects of trial monitoring (group sequential designs).

BIOS 6651 **M.S. Research Paper**  
1-6 cr.  
Dr. G. Grunwald (Fall, Spring, Summer)  
M.S. research paper is completed under this course.

BIOS 6655 **Statistical Methods in Genetic Association Studies**  
3.0 cr.  
Dr. T. Fingerlin (Fall)  
This course is designed to give an introduction to statistical methods in genetic association studies. Topics include an introduction to population genetics topics relevant to genetic association studies, design strategies, and analysis methods for case-control and family data.

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*University of Colorado Denver Health Sciences Programs 2008-2009*
<table>
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<tr>
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<th>Prerequisites</th>
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</thead>
<tbody>
<tr>
<td>BIOS 6659</td>
<td>Statistical Methods in Genomics</td>
<td>2.0 cr.</td>
<td>Dr. K. Kechris (Fall)</td>
<td>Prereq: BIOS 6611 or equivalent graduate level statistics course with consent of instructor. Cross-listed: BIOI 7659. This course will give an introduction to statistical methods for analyzing molecular sequences and genomic data. Topics include hidden Markov models for sequence alignment, molecular evolution and gene expression data analysis.</td>
</tr>
<tr>
<td>BIOS 6680</td>
<td>SAS Database Design and Management</td>
<td>3.0 cr.</td>
<td>J. Bondy (Fall)</td>
<td>This course introduces students to SAS programming, specifically how SAS can be used to manipulate data and prepare it for analysis: inputting, recoding, reformatting, subsetting, and merging data, as well as writing simple reports and SAS Macros.</td>
</tr>
<tr>
<td>BIOS 6681</td>
<td>Relational Data Management Systems for Medical Research</td>
<td>1.0 cr.</td>
<td>Dr. D. Lezotte (Spring)</td>
<td>This course provides the necessary introduction and experience to build and maintain information systems to facilitate data intensive clinical, epidemiological or health services research in an academic health sciences environment.</td>
</tr>
<tr>
<td>BIOS 6683</td>
<td>Introduction to Health Information Technology</td>
<td>3.0 cr.</td>
<td>P. Kaplan (Spring)</td>
<td>Prereq: Graduate degree in Clinical Sciences or HSMP 6603 or permission of instructor. An introductory course in Medical Informatics that exposes students to a broad spectrum of computer-based applications in the areas of clinical medicine and public health; with focus on applications that use data, information and knowledge processed by computers.</td>
</tr>
<tr>
<td>BIOS 6840</td>
<td>Research in Biostatistics</td>
<td>1-3 cr.</td>
<td>Dr. G. Grunwald (Fall, Spring, Summer)</td>
<td>Prereq: Consent of Program Director Resources of the program are available to those students who elect to carry out research in chosen topics. A faculty member will provide guidance throughout the project.</td>
</tr>
<tr>
<td>BIOS 6950</td>
<td>M.S. Thesis</td>
<td>1-6 cr.</td>
<td>Dr. G. Grunwald (Fall, Spring, Summer)</td>
<td>M.S. thesis work is completed under this course.</td>
</tr>
<tr>
<td>BIOS 7711</td>
<td>Longitudinal Data Analysis</td>
<td>3.0 cr.</td>
<td>Dr. G. Zerbe (Fall)</td>
<td>Prereq: BIOS 6612. The theory and application of univariate and multivariate techniques appropriate for longitudinal data are discussed with emphasis on recently developed growth curve and longitudinal models. Students will be exposed to theoretical developments and will analyze real data.</td>
</tr>
<tr>
<td>BIOS 7712</td>
<td>Statistical Methods for Correlated Data</td>
<td>1.0 cr.</td>
<td>Dr. G. Grunwald (Spring)</td>
<td>Prereq: BIOS 7711. This course will cover special topics in applied statistics. Details of content will be announced by the instructor.</td>
</tr>
<tr>
<td>BIOS 7713</td>
<td>Statistical Methods for Missing Data</td>
<td>2.0 cr.</td>
<td>Dr. D. Fairclough (Spring)</td>
<td>Prereq: BIOS 7711 and BIOS 7712. This course covers methodological research being carried out for longitudinal studies with missing data. Topics include missing data mechanisms, non-ignorable missing data, multiple imputation, mixture models and sample size determination. Students will complete a project applying methods to real datasets.</td>
</tr>
<tr>
<td>BIOS 7899</td>
<td>Independent Study in Biostatistics</td>
<td>1-4 cr.</td>
<td>Dr. G. Grunwald (Fall, Spring, Summer)</td>
<td>Prereq: Consent of Program Director. This course is for the advanced student who wishes to pursue one or more topics in depth. These topics may involve biostatistical material or biological material necessary to the student's biostatistical work. Supervision by a full-time faculty member is necessary.</td>
</tr>
<tr>
<td>BIOS 8990</td>
<td>Doctoral Thesis</td>
<td>1-10 cr.</td>
<td>Dr. G. Grunwald (Fall, Spring, Summer)</td>
<td>PhD dissertation work is completed under this course.</td>
</tr>
</tbody>
</table>

**BIOMOLECULAR STRUCTURE**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMST 7350</td>
<td>Proteins</td>
<td>3.0 cr.</td>
<td>Dr. R. Hodges – (Spring)</td>
<td>Crosslisted: PHSC 7350. Provide chemical/physical basis for protein structure, folding, function and stability. Presents methods/principles of protein/peptide purification and enzyme catalysis including electron transfer and mutagenesis. The role of molecular dynamics and use of molecular simulations in the investigations of protein-ligand/protein-protein interactions.</td>
</tr>
</tbody>
</table>
BMST 7354 Structural Analysis of Bio-molecules I  2.0 cr.
Dr. R. Hodges – (Spring) Crosslisted: PHSC 7354.
Describes fundamentals of spectroscopic methods used to study protein structure/function. These techniques include optical methods (CD spectroscopy, fluorescence and absorbance) vibrational methods (IR and EST), analytical ultracentrifugation, mass spectrometry, calorimetry, light scattering and Biacore analysis. Taught alternate years.

BMST 7450 Protein Chemistry II  2.0 cr.
Dr. R. Hodges – (Spring) Crosslisted: PHSC 7450.
Protein Chemistry II presents methods and principles of protein/peptide purification and enzyme catalysis, including electron transfer and mutagenesis. The investigation of protein and enzyme structure/function, the role of molecular dynamics and use of molecular simulations in investigations of protein-ligand/protein-protein interactions will also be presented.

BMST 7454 Structural Analysis of Biomolecules II  2.0 cr.
Dr. R. Hodges – (Spring) Crosslisted: PHSC 7454.
Methods and strategies for determination of the primary and 3-dimensional structures of biologically important molecules. Crystallography, nuclear magnetic resonance spectroscopy and mass spectrometry will be taught in structural determination of proteins, nucleic acids complex carbohydrates, and lipid molecules.

BMST 7650 Research in Biomolecular Structure  Variable cr.
Dr. R. Hodges – (Fall, Spring, Summer) Prereq: Consent of instructor.
Research work in Biomolecular Structure.

BMST 7660 Biomolecular Structure Seminar  1.0 cr.
Dr. R. Hodges – (Fall, Spring)
Seminar series provides a forum for the presentation of scientific experiments and information in structural biology by faculty, postdoctoral fellows and graduate students.

BMST 8990 Doctoral Thesis  Variable cr.
Dr. R. Hodges – (Fall, Spring, Summer)
Doctoral thesis work in Biomolecular Structure.

CANCER BIOLOGY

CANB 7600 Cancer Biology  3.0 cr.
Dr. S. K. Nordeen - (Spring) Prereq: IDPT 7801, IDPT 7802, IDPT 7803.
This course integrates the examination of cancer at molecular, cellular, tissue and organismal levels. Course open to all graduate students from any program with an interest in mechanisms and models of cancer and will give broad appreciation for current issues/problems.

CANB 7613 Research Seminars and Journal Club  1.0 cr.
Dr. R. Evans – (Fall, Spring)
Current research topics in experimental pathology, virology, and tumor biology. Graduate students and faculty presentations.

CANB 7620 Histophysiology  3.0 cr.
Dr. D. Orlicky - (Spring)
Discussions of cell interactions, tissue physiology, and renewal based upon the histologic cell types and structures present. Where pertinent, pathologic alterations will be introduced to facilitate identification of the important normal functions/structures.

CANB 7650 Research in Cancer Biology  Variable cr.
Dr. S. K. Nordeen - (Fall, Spring, Summer) Prereq: Consent of instructor.
Research work in cancer biology.

CANB 8990 Doctoral Thesis  Variable cr.
Dr. S. K. Nordeen - (Fall, Spring, Summer) Prereq: Consent of instructor.
Doctoral thesis work in cancer biology.

CANDIDATE FOR DEGREE

CAND 6940 Candidate for Degree  1.0 cr.
F. Osterberg - (Fall, Spring, Summer) Prereq: Consent of instructor.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Schedule</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLSC 6040</td>
<td>Introduction to Database &amp; Web Design Programming</td>
<td>2.0 cr.</td>
<td>J. Huggins, MSW, MSCIS</td>
<td>(Fall, Spring)</td>
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<td></td>
<td>This course is designed to provide 3 primary tools. First, an introduction to using MS Access as a</td>
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<td>database tool. Second, an introduction to designing web pages using Adobe Dreamweaver. Finally,</td>
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<td>connecting the database to the web.</td>
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<tr>
<td>CLSC 6050</td>
<td>Designing and Implementing Clinical Disease Management Programs</td>
<td>2.0 cr.</td>
<td>Dr. D. Tinkelman</td>
<td>(Spring) Crosslisted: CLSC 7050 Prereq: None,</td>
<td>BIOS 6601 or BIOS 6611 is recommended</td>
</tr>
<tr>
<td></td>
<td>Course is designed to introduce masters level to new and broadening field of disease management.</td>
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<td></td>
<td>but BIOS 6601 or BIOS 6611 is recommended</td>
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<td></td>
<td>Students will learn about the positive/negative aspects of varied approaches in the field. Economic</td>
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<td></td>
<td>and clinical aspects of disease management will be discussed.</td>
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<tr>
<td>CLSC 6060</td>
<td>Systems Analysis and Design</td>
<td>3.0 cr.</td>
<td>Dr. D. Tinkelman</td>
<td>(Fall, Spring, Summer) Crosslisted: CU Denver</td>
<td>ISMG 6040. Offered as a collaborative offering with</td>
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<tr>
<td></td>
<td>Course emphasizes introduction to masters level in new and broadening field of disease management.</td>
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<td></td>
<td>ISMG 6040. Offered as a collaborative offering with</td>
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<td></td>
<td>Students will learn about the positive/negative aspects of varied approaches in the field. Economic</td>
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<td>UCDenver.</td>
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<tr>
<td></td>
<td>and clinical aspects of disease management will be discussed.</td>
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<tr>
<td>CLSC 6080</td>
<td>Database Management Systems</td>
<td>3.0 cr.</td>
<td>Dr. W. Zhiping</td>
<td>(Fall, Spring, Summer) Crosslisted: CU Denver</td>
<td>ISMG 6080. Offered as a collaborative offering with</td>
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<td></td>
<td>Offered as a collaborative offering with UCD, this course focuses on the development and management of</td>
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<td>ISMG 6080. Offered as a collaborative offering with</td>
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<td></td>
<td>database systems to support business operations. Important subjects include semantic data modeling,</td>
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<td>UCDenver.</td>
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<td>normalization, SQL, fourth generation languages, and client-server database applications.</td>
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<tr>
<td>CLSC 6120</td>
<td>Data Communications</td>
<td>3.0 cr.</td>
<td>Dr. S. Walczak</td>
<td>(Fall, Spring, Summer) Crosslisted: CU Denver</td>
<td>ISMG 6120 Prereq: Knowledge of computer programming.</td>
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<tr>
<td></td>
<td>Offered as a collaborative offering with UCD, this course introduces the basic concepts of data</td>
<td></td>
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<td>ISMG 6120 Prereq: Knowledge of computer</td>
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<td>transmission, principles governing the design and administration of both wide and local area</td>
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<td>programming.</td>
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<td>networks, and technical issues pertaining to client server computing and open system</td>
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<td></td>
<td>interconnection.</td>
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<td>CLSC 6251</td>
<td>Assistive Technology: Advanced Practices in AT Assessment</td>
<td>3.0 cr.</td>
<td>M. Melonis, M.N.S.</td>
<td>(Fall, Spring, Summer)</td>
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<td></td>
<td>Students will learn to use family-centered, trans-disciplinary methods of assistive technology</td>
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<td>assessment for individuals with low-incidence disabilities. Observations, videotaped learning</td>
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<td>activities, and supervised assessment sessions will facilitate understanding of best practice in the</td>
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<td>field.</td>
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<tr>
<td>CLSC 6261</td>
<td>Assistive Technology: Implementation for Low Incidence Disabilities</td>
<td>3.0 cr.</td>
<td>Dr. C. Bodine</td>
<td>(Summer)</td>
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<td>This course provides an overview of low incidence populations (including intellectual, hearing, and</td>
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<td>vision impairments), relevant research, and implementation strategies in early childhood and</td>
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<td>classroom settings. Emphasis is on implementation techniques, and working with trans-disciplinary</td>
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<td>teams, supporting agencies, and families.</td>
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<tr>
<td>CLSC 6271</td>
<td>Assistive Technology: Advanced Fieldwork Experience in AT</td>
<td>2.0 cr.</td>
<td>Dr. C. Bodine</td>
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<td>Students participate in fieldwork experiences offering individually-tailored opportunities to</td>
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<td>engage in AT assessments, implementation of AT in various settings, family-centered Individual</td>
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<td>Educational Planning meetings, report-writing, outcomes-measurement, data-collection, practice,</td>
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<td>research-based methodologies. Peer-reviewed submission must be coordinated before grade assigned</td>
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<td>CLSC 6281</td>
<td>Assistive Technology: Engineering and Biotechnology: Principles &amp; Emerging Technologies</td>
<td>3.0 cr.</td>
<td>Dr. C. Bodine</td>
<td>(Fall, Summer)</td>
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<td>Course brings together engineers, AT students in other health-care related areas. The students</td>
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<td>develop an understanding of engineering principles, technical design process, emerging technologies</td>
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<td>relevant to assistive technology in the context of support for children with low-incidence</td>
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<td>disabilities.</td>
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<td>CLSC 6300</td>
<td>Scientific Grant Review Process: GCRC Proposals</td>
<td>1.0 cr.</td>
<td>Dr. R. Eckel</td>
<td>(Fall, Spring) Prereq: BIOM 6601, BIOM 6602</td>
<td>BIOM 6611-BIOM 6612 &amp; CLSC 7500.</td>
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<td>Intended for second year students. Students will understand and participate in the process of</td>
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<td>or BIOM 6602 or BIOM 6611-BIOM 6612 &amp; CLSC</td>
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<td>scientific review of human subject research protocols submitted to the University of Colorado Health</td>
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<td>Health Science Center's GCRCs (both Adult and Pediatric GCRCs).</td>
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<td>CLSC 6500</td>
<td>Introduction to Clinical Research</td>
<td>1.0 cr.</td>
<td>Dr. J. Crapo</td>
<td>(Fall)</td>
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<td>This course provides an introduction to the general field of Clinical Research. It is designed for</td>
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<td>individuals who are interested in learning the fundamentals of how to prepare a scientific research</td>
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<td>proposal.</td>
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CLSC 6501  Introduction to Adult Medicine Research  1.0 cr.
Dr. J. Crapo - (Fall, Summer)
An introduction to the general field of clinical science with a focus on topics relevant to clinical research in the field of adult medicine. Designed for individuals interested in learning the fundamentals of how to prepare a scientific research proposal.

CLSC 6502  Clinical Research Training Program Intensive, Part II  4.0 cr.
Dr. J. Crapo - (Fall)
CRTP Intensive- Part I (This two-part series must be taken as a whole to obtain any credit). Grades are assigned only after Part II is completed.

CLSC 6503  Clinical Research Training Program Intensive, Part II  4.0 cr.
Dr. J. Crapo - (Spring) Prereq: CRTP Intensive, Part I.
CRTP Intensive- Part II (This two-part series must be taken as a whole to obtain any credit). Grades are assigned only after Part II is completed.

CLSC 6550  Applications of Biostatistics to Clinical Research Questions  1.0 cr.
Dr. J. Crapo - (Fall, Spring, Summer)
Introduction to allow clinician-scientists to be critical consumers of medical literature by improving their ability to discuss statistical issues about their own research and research of others. Familiarity will be gained with commonly used statistical methods and statistical terms.

CLSC 6591  Clinical Research Training Program Intensive, Parts 1 & 2  8.0cr.
Dr. J. Crapo - (Summer) Prereq: Graduate degree in clinical science or PRMD 6603 or consent.
This two-part series must be taken as a whole to obtain any credit. Grades are assigned only after part 2 is completed. CLSC 6591 should be taken by Adult-PhD, MSCS and Certificate Students.

CLSC 6592  Clinical Research Training Program Intensive, Parts 1 & 2  8.0cr.
Dr. J. Crapo - (Summer) Prereq: Graduate degree in clinical science or PRMD 6603 or consent.
This two-part series must be taken as a whole to obtain any credit. Grades are assigned only after part 2 is completed. CLSC 6592 should be taken by Pediatric-PhD, MSCS and Certificate Students.

CLSC 6593  Clinical Research Training Program Intensive, Parts 1 & 2  8.0cr.
Dr. J. Crapo - (Summer) Prereq: Graduate degree in clinical science or PRMD 6603 or consent.
This two-part series must be taken as a whole to obtain any credit. Grades are assigned only after part 2 is completed. CLSC 6593 should be taken by Adult-CRTP Students.

CLSC 6594  Clinical Research Training Program Intensive, Parts 1 & 2  8.0cr.
Dr. J. Crapo - (Summer) Prereq: Graduate degree in clinical science or PRMD 6603 or consent.
This two-part series must be taken as a whole to obtain any credit. Grades are assigned only after part 2 is completed. CLSC 6594 should be taken by Pediatric-CRTP Students.

CLSC 6606  Statistics for the Basic Sciences  3 cr.
Dr. J. Crapo - (Fall, Spring) Course Restrictions: Enrollment in CLSC graduate program or permission of the instructor.
This course provides an overview of fundamental concepts in statistics such as hypothesis testing and estimation, and it provides an overview of statistical methods (for example, regression and analysis of variance) that apply to many areas of science.

CLSC 6608  Statistics for the Basic Sciences – CLSC Supplement  8 cr.
Dr. J. Crapo - (Spring) Co-requisites: CLSC 6606 (BIOS 6606) Course Restrictions: Enrollment in CLSC graduate program or permission of the instructor.
This course provides an overview of epidemiology, logistic regression, and survival analysis, techniques that apply to many areas of clinical research.

CLSC 6650  Guided Research Tutorial – General  Variable cr.
Dr. J. Crapo - (Fall, Spring, Summer).
Students perform research projects during rotations under the direction of a mentor. Required of graduate students in the Clinical Sciences program.

CLSC 6651  Guided Research Tutorial - Pediatric GCRC Research  2.0 cr.
Dr. F. Accurso – (Spring) Prereq: CLSC 7300 and CLSC 7500.
Students perform Pediatric GCRC research projects during rotations under the direction of Pediatric GCRC faculty member(s).

CLSC 6652  Guided Research Tutorial – Adult GCRC Research  2.0 cr.
Dr. M. Garrity – (Spring) Prereq: CLSC 7300, CLSC 7500.
Students perform Adult GCRC research projects during rotations under the direction of an Adult GCRC faculty member(s).
CLSC 6653  Key Concepts in Neurodevelopmental Disabilities I     2.0 cr.
Dr. J. Crapo - (Fall) Prereq: A degree in health care profession or related field or instructor consent.
This course represents part one of two-part interdisciplinary course series focused on systems, options for
diagnosis/assessment and alternatives for service provision related to children/youth/young adults with
neurodevelopmental and related disabilities and their families to address this population’s special health care needs.

CLSC 6654  Key Concepts in Neurodevelopmental Disabilities II     2.0 cr.
Dr. J. Crapo - (Spring) Prereq: A degree in health care profession or related field or instructor consent,
and completion of CLSC 6653.
This course represents part two of a two-part interdisciplinary course series focused on service provision,
treatment strategies and service provision related to children/youth/young adults with neurodevelopmental and related
disabilities and their families to address this population’s special health care needs.

CLSC 6655  Guided Research Tutorial – Proteomics     1.0 cr.
Dr. J. Crapo - (Fall, Spring, Summer)
Students perform research projects during rotations under the direction of a mentor in the U01 Proteomics
Clinical Research Network. Required of graduate students in the Clinical Sciences program participating in the U01.

CLSC 6657  Cultural Factors in Healthcare     1.0 cr.
C. Mestas, M.A. - (Fall, Spring, Summer) Prereq: A degree in health care profession or related field or instructor consent.
This course will introduce the subject of cultural/social determinants of maternal and child health in the present
society, including worldviews on health perspectives (wellness versus illness), and address the impact of emerging
demographic changes on systems of care.

CLSC 6658  Interdisciplinary Approach to Promoting Early Parent Child Relationships –
Part I: Theory     2.0 cr.
Dr. C. Robinson - (Fall) Prereq: A degree in health care profession or related field or instructor consent.
Part one of a two-part course series that will examine the theory and research relevant to the assessment of
early parent-child relationships as well as the clinical application for interventions across disciplines that are intended to
promote/improve child health outcomes.

CLSC 6659  Interdisciplinary Approach to Promoting Early Parent Child Relationships –
Part II: Measurement     3.0 cr.
Dr. C. Robinson - (Spring) Prereq: A degree in health care profession or related field or instructor consent. Completion of
CLSC 6658.
Part two of a two-part course that will examine research relevant to assessment of early parent/child
relationships, identify intervention strategies by analyzing observational findings, as well as evaluate effectiveness of
interventions across disciplines intended to promote/improve child health outcomes.

CLSC 6661  Leadership Dialogues I     2.0 cr.
Dr. C. Robinson - (Fall) Prereq: A degree in health care profession or related field or instructor consent.
This interdisciplinary leadership course focuses on leadership strategies needed for providing family-centered,
culturally competent, community-based services for children with special needs and their families.

CLSC 6662  Leadership Dialogues II     2.0 cr.
Dr. C. Robinson - (Spring) Prereq: A degree in health care profession or related field or instructor consent.
CLSC 6661
Leadership Dialogues II builds upon the skills addressed in Leadership Dialogues I with the addition of content
that integrates critical and systems thinking and ethical decision making with the leadership and team concepts and skills
developed in Leadership Dialogues I.

CLSC 6663  Best Practice in Early Intervention for Families of Children with Autism     2.0 cr.
Dr. C. Robinson - (Fall, Spring, Summer) Prereq: Degree in health care profession or related field or consent of instructor.
Through combination of lectures, on-going case discussions, on-site supervised practicum experience working
with families of young children with autism, participants will improve their skills in family-focused home/school-based
interventions designed to promote social/communicative skills for children with an autism spectrum disorder.

CLSC 6664  Leadership Dialogues III     1.0 cr.
Dr. C. Robinson - (Fall) Prereq: Degree in health care profession or related field or consent of instructor.
This interdisciplinary leadership course focuses on leadership strategies needed for providing family-centered,
culturally competent, community-based services for children with special needs and their families. (Nursing only)

CLSC 6665  Leadership Dialogues IV     1.0 cr.
Dr. C. Robinson - (Spring) Prereq: Degree in health care profession or related field or consent of instructor and
CLSC6664.
Leadership Dialogues IV builds upon skills addressed in Leadership Dialogues III with the addition of content
that integrates critical and systems thinking and ethical decision making with the leadership and team concepts and skills
developed in LD III. (Nursing only)
CLSC 6666  Trans-disciplinary Model of Early Intervention Service Delivery  3.0 cr.
Dr. C. Robinson - (Fall, Spring, Summer). Prereq: Degree in health care profession or related field or consent of instructor. Course Restrictions: Course participants accepted by course instructor approval only.
This course provides instruction about the ENRICH model of community-based, family-driven, trans-disciplinary service delivery and will target service coordination/collaboration throughout Part C supports and services, best practice implementation of intervention strategies, and techniques for transferring out of Part C.

CLSC 6699  Research in Clinical Sciences for Masters Students  Variable cr.
Dr. J. Crapo - (Fall, Spring, Summer).
Class is research in clinical science field planned to have direct relevance to Masters Thesis project where student is working under mentor faculty member’s guidance/direction. Classwork may also be associated with preparing for written component of Master’s final exam component.

CLSC 6700  Evidence Based Medicine/Health Care  2.0 cr.
Dr. J. Crapo - (Fall, Spring, Summer).
Course designed to provide basic introduction to field of clinical science related to evidence-based medicine/health care. Students will learn how to critically appraise literature, evaluate diagnostic test performance/alternative therapies, use/design clinical pathways, implement evidence-based medicine findings in own clinical-practice setting.

CLSC 6800  Introduction to Health Information Technology  3.0 cr.
Dr. D. Lezotte - (Spring) Crosslisted: UCD: HLTH 6071.
This course is intended as an overview to the dynamic environment of healthcare informatics. The goal of the course is to prepare healthcare professionals to better utilize and manage the emerging communication technologies. A brief introduction to e-health, telehealth, electronic medical records, tele-communications, and bio-informatics is provided.

CLSC 6820  Fundamentals of Health Information Technology Management  3.0 cr.
Dr. D. Lezotte - (Fall). Crosslisted: CU Denver HLTH 6072.
This course will provide an introduction to management of information technology in healthcare. A description of information processing, the origin, content and evolution of healthcare information systems and the methodologies deployed to acquire and manage information requirements will be discussed.

CLSC 6830  Practicum in Developmental Disabilities  Variable cr.
Dr. C. Robinson - (Spring, Summer, Fall) Prereq: Consent of instructor.
Practicum in developmental disabilities individually designed to give students and post-graduates observational experiences in clinical, teaching, or research service settings and systems for persons with developmental disabilities of all ages.

CLSC 6831  Practicum in Developmental Disabilities II  3.0 cr.
Dr. C. Robinson - (Spring) Prereq: Instructor consent and CLSC 6830.
Practicum in developmental disabilities individually designed to give students and post graduates hands-on experiences in clinical, teaching, or research service settings and systems for persons with developmental disabilities of all ages.

CLSC 6890  Introduction to Telehealth/Telemedicine  2.0 cr.
Dr. J. Grigsby - (Summer)
This course will examine different Telemedicine/Telehealth options currently available. A primary goal will be for students to evaluate how clinical outcomes and health care education (e.g., patient education and health care provider education) can be improved using new technologies.

CLSC 6950  Masters Thesis  Variable cr.
Dr. J. Crapo - (Fall, Spring, Summer)
Masters thesis work in clinical science.

CLSC 7050  Designing and Implementing Clinical Disease Management Programs  2.0 cr.
Dr. J. Crapo - (Spring) Prereq: None but BIOM 6601/6602 or BIOM 6611/6612/6613 are suggested.
This course designed to introduce participants to the new and broadening field of disease management. Students will learn about the positive/negative aspects of varied approaches in the field. The economic and clinical aspects of disease management will be discussed.

CLSC 7101  Grant Writing I  1.0 cr.
Dr. J. Crapo - (Fall, Spring, Summer) Prereq: BIOS 6601-6602, CLSC 7150 or CLSC 7151, PRMD 6626 or BIOS 6648.
This first grant writing course prepares students for subsequent grant submission. Strategies for preparation (including hypothesis generation, experimental design, statistical considerations, potential problems) will be discussed. At end of class, a grant submission will normally occur before grade is assigned.

CLSC 7102  Grant Writing II  1.0 cr.
Dr. J. Crapo – (Fall, Spring, Summer) Prereq: CLSC 7101.  
Continuation of CLSC-7101. Course prepares students for subsequent grant submission. Strategies for preparation (including hypothesis generation, experimental design, statistical considerations, potential problems) will be discussed. At course end, a K08, R23, or equivalent grant application will be completed for submission.

CLSC 7150  Ethics and Regulation in Human Subjects Review  1.0 cr. 
Dr. A. Prochazka - (Fall, Spring, Summer)  
Course provides overview of the field of ethics in clinical research. Students will learn historical background, current regulations, IRB requirements related to human subjects protection issues. This course requires attendance at IRB sessions for CLSC PhD and Certificate students enrolled.

CLSC 7151  Lectures in Ethics and Regulation in Human Subjects Review  1.0 cr. 
Dr. A. Prochazka - (Fall, Spring, Summer)  
Course will provide overview of the field of ethics in clinical research. It is designed for non-Clinical Science degree students, certificate students, investigators who will be conducting research involving human subjects. Topics include historical background, current regulations, and IRB requirements.

CLSC 7155  Advanced Bioethics  1.0 cr. 
Dr. A. Prochazka - (Fall, Spring, Summer) Prereq: CLSC 7150 or CLSC 7151, COMIRB 101, PHSC 7339, instructor consent.  
This course will provide an in-depth understanding of advanced bioethics - where the frontiers for ethical clinical decision-making currently exist – and also provide a broad-based overview of all aspects of responsible conduct of research according to NIH standards.

CLSC 7160  Philosophical Foundations of Research Ethics  2.0 cr. 
Dr. M. Yarborough - (Spring) Crosslisted: IDPT 7160  
This course will examine the philosophical basis for current research ethics practices, address current ethical issues and controversies in biomedical research, and provide students with knowledge and analytical skills to address the ethical dimensions of biomedical research.

CLSC 7200  Clinical Outcomes Assessment  2.0 cr. 
Dr. J. Crapo - (Fall, Spring, Summer).  
Course provides overview of field of clinical outcomes assessment, prepares student to identify patient risk factors which may influence outcomes, to select outcomes appropriate to use in situation based on critical appraisal of literature in context of research project’s goals/objectives.

CLSC 7300  Scientific Grant Review Process: GCRC Proposals  1.0 cr. 
Dr. R. Eckel - (Fall, Spring) Prereq: BIOM 6601, 6602, or BIOS 6611-6612 and CLSC 7500.  
Intended for second year students. Students will understand and participate in the process of scientific review of human subject research protocols submitted to the University of Colorado Denver Anschutz Medical Center’s GCRCs (both Adult and Pediatric GCRCs).

CLSC 7400  Theory and Application of Techniques for the Study of Human Metabolism In Vivo  2.0 cr. 
Dr. T. Horton - (Fall) Prereqs: CLSC 7150/7151, BIOS 7151, CLSC 6500/6501, PRMD 6626, BIOM 6648.  
This advanced clinical investigation course will critically review lab-based techniques and experimental approaches used to study nutrient metabolism in vivo. Students will learn the theory, appropriate application and limitations of these techniques/approaches.

CLSC 7450  Biopharmaceutics and Applied Pharmacokinetics  2.0 cr. 
Dr. J. Crapo - (Summer). Prereq: Undergrad Biochemistry BIOM 6602.  
This advanced pharmacokinetics course will provide working knowledge of drug administration, distribution, metabolism and excretion as well as provide practical clinical working examples of pharmacokinetics (drug clearance and distribution).

CLSC 7500  Practical Application of Molecular and Cell Biology Techniques for the Clinical Investigator  3.0 cr. 
Dr. A. Bradford – (Summer)  
Designed to teach clinical investigators basic molecular and cellular biology techniques. Format will be hands-on with lectures designed to illustrate significance and clinical application of techniques. Weekly special topics lectures will cover cutting-edge technologies and their application.

CLSC 7650  Guided Research Tutorial – General  Variable cr. 
Dr. J. Crapo - (Fall, Spring, Summer)  
Students perform research projects during rotations under the direction of a mentor. Required of graduate students in the Clinical Sciences PhD program.

CLSC 7651  Guided Research Tutorial, Pediatric GCRC  2.0 cr. 
Dr. F. Accurso - (Spring) Prereq: CLSC 7300 and CLSC 7500.  
University of Colorado Denver Health Sciences Programs 2008-2009 71
Students perform Pediatric GCRC research projects during rotations under the direction of Pediatric GCRC faculty member(s).

**CLSC 7652 Guided Research Tutorial – Adult GCRC Research**  
Dr. M. Garrity - (Spring)  Prereq: CLSC 7300 and CLSC 7500.  
Students perform Adult GCRC research projects during rotations under the direction of Adult GCRC faculty member(s).

**CLSC 7700 Evidence Based Medicine/Health Care**  
Dr. J. Crapo - (Spring, Summer)  
Course designed to provide introduction to field of clinical science related to evidence based medicine/health care. Students will learn to critically appraise literature, evaluate diagnostic test performance/alternative therapies, use/design clinical pathways, implement evidence based medicine findings in clinical practice settings.

**CLSC 7890 Research in Clinical Sciences for Doctoral Students**  
Dr. J. Crapo - (Fall, Spring, Summer)  
Research in clinical science field planned to have direct relevance to PhD dissertation project with doctoral student working under mentor faculty member’s guidance/direction. Class work may be associated with preparing for written component of PhD or oral comprehensive exam component.

**CLSC 8990 Doctoral Thesis**  
Dr. J. Crapo - (Fall, Spring, Summer)  Prereq: Consent of Instructor  
Doctoral thesis work in clinical science.

### CELL BIOLOGY, STEM CELLS & DEVELOPMENT

**CSDV 7605 Stem Cells and Development: an Integrated Approach**  
Dr. L Barlow – (Spring)  Prereq: IDPT 7801, IDPT 7802, IDPT 7803  
Integrative introductory course, incorporating related fields of Cell Biology/Developmental Biology/Stem Cells/Regenerative Medicine. Through lectures, discussions of current literature, student presentations; enrollees will gain a sophisticated understanding of basic cell biological concepts/experimental approaches underlying our current understanding of developmental/stem cell biology

**CSDV 7650 Research in Cell Biology, Stem Cells and Development**  
Dr. S. Britt – (Fall, Spring, Summer)  Prereq: Consent of Instructor  
Research work in Cell Biology, Stem Cells and Development.

**CSDV 7670 Advanced topics in Cell Biology, Stem Cells and Development**  
Dr. L Barlow – (Fall, Spring, Summer)  Prereq: IDPT 7801, IDPT 7802, IDPT 7803  
Topics covered in course vary from year to year. First topic offering: “Cell Signaling and its regulation in cancer” by Drs. Reyland and Schedin. Second topic offering is “Neural stem cells in development and disease” by Drs. Artinger & Barlow.

**CSDV 7850 Independent Study in Cell Biology, Stem Cells and Development**  
Dr. S. Britt – (Fall, Spring, Summer)  Prereq: IDPT 7801, IDPT 7802, IDPT 7803, CSDVI 7605  
Independent Study is to allow students to take professional school course for credit or to gain a defined expertise with faculty mentor other than thesis advisor. Consent of faculty member offering the independent study and Program Director required.

**CSDV 8990 Doctoral Thesis**  
Dr. S. Britt - (Fall, Spring, Summer)  Prereq: Consent of the instructor  
Doctoral Thesis work in Cell Biology, Stem Cells and Development.

### GENETIC COUNSELING

**GENC 6101 Psychosocial Aspects of Genetic Counseling 1**  
C. Walton, M.S. – (Fall)  Coreqs: GENC 6105, GENC 6110.  Course Restrictions: Matriculated student in Genetic Counseling M.S. Program  
This is the first course in a two-semester sequence addressing basic psychosocial and counseling theories, approaches, and resources necessary for the provision of genetic counseling to clients and their families in prenatal, pediatric and adult clinical settings.

**GENC 6102 Psychosocial Aspects of Genetic Counseling 2**  
C. Walton, M.S. – (Spring)  Prereq: GENC 6101  Coreqs: GENC 6105, GENC 6110.  Course Restrictions: Matriculated student in Genetic Counseling M.S. Program
This is the second course in a two-semester sequence addressing basic psychosocial and counseling theories, approaches, and resources necessary for the provision of genetic counseling to clients and their families in prenatal, pediatric and adult clinical settings.

**GENC 6105 Basic Interviewing Skills**  1.0 cr.
C. Walton, M.S. – (Spring) Coreqs: GENC 6101, GENC 6110. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program

This course covers fundamental theories and principles of effective patient/client interviewing in genetic counseling practice. Lectures are combined with hands-on role plays and interviews so that students may gain applied experience and receive feedback to foster skills development throughout course.

**GENC 6110 Topics in Medical Genetics I**  3.0 cr.
C. Walton, M.S. – (Fall) Course Restrictions: Matriculated student in Genetic Counseling M.S. Program

First course in a two-course sequence regarding principles of clinical genetics and genetic counseling, and development of clinical skills used in various medical genetics settings. Fall semester focuses on principles important in pediatric and general genetics settings.

**GENC 6111 Topics in Medical Genetics II**  2.0 cr.
C. Walton, M.S. – (Spring) Prereq: GENC 6110. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program

Second course in two-course sequence regarding principles of clinical genetics and genetic counseling used in various medical genetics settings, and development of clinical skills. Spring semester focuses on prenatal and adult genetics clinic settings.

**GENC 6120 Clinical Cytogenetics and Molecular Genetics**  3.0 cr.
C. Walton, M.S. – (Fall) Coreq: GENC 6121. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program

This course provides integrated instruction regarding human cytogenetic and molecular genetic principles, techniques, and diagnostic testing approaches used in clinical evaluation and risk assessment for genetic disorders/predispositions in prenatal and postnatal patient populations.

**GENC 6121 Laboratory in Clinical Cytogenetics and Molecular Genetics**  2.0 cr.
C. Walton, M.S. – (Fall) Coreq: GENC 6120. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program

Course provides introduction to specific methodologies and interpretation of studies used in diagnostic cytogenetics and molecular genetics laboratories. Principles discussed in the co-requisite clinical cytogenetics and molecular genetics course will be applied through demonstrations, hands-on experiments, discussion of illustrative cases.

**GENC 6122 Seminar in Clinical Cytogenetics and Molecular Genetics**  1.0 cr.
C. Walton, M.S. – (Spring) Prereq: GENC 6120, GENC 6121. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program

Course requires students to apply theories/principles of cytogenetics and molecular genetics to analysis of cases that present in daily operations of diagnostic laboratories and formal critique of current research literature. Additionally, students present formal seminar integrating cytogenetic/molecular genetic principles.

**GENC 6130 Cancer Genetics and Genetic Counseling**  2.0 cr.
C. Walton, M.S. – (Spring) Prereq: GENC 6110, GENC 6120. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program

Course in providing genetic counseling services to clients with or at risk for hereditary cancer predisposition. Topics include clinical oncology, epidemiology, molecular biology of cancer, risk assessment, genetic testing, ethical/legal issues, clinical research considerations, psychosocial impact/support, specific genetic counseling approaches.

**GENC 6140 Human Inborn Errors of Metabolism**  2.0 cr.
C. Walton, M.S. – (Spring) Course Restrictions: Matriculated student in Genetic Counseling M.S. Program

Course provides systematic review of major metabolic disorders, including their clinical phenotypes, diagnosis, and management. Physiological and laboratory testing principles important to understanding these disorders will be reviewed. Psychosocial impact of metabolic disorders and genetic counseling approaches will be discussed.

**GENC 6150 Congenital Malformations and Disorders of the Newborn**  1.0 cr.
C. Walton, M.S. – (Spring) Prereq: GENC 6110. Coreq: GENC 6111. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program

This survey course covers common major malformations and non-metabolic genetic disorders identified by newborn screening programs. Clinical phenotypes, diagnosis, management and etiology are addressed. Psychosocial impact of these conditions and genetic counseling approaches will be discussed.

**GENC 6201 Advanced Psychosocial Genetic Counseling**  2.0 cr.
C. Walton, M.S. – (Fall) Prereq: GENC 6101 and GENC 6102. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program
This course examines advanced genetic counseling techniques as they relate to psychosocial theories, specific client characteristics and the client/counselor dynamic. Critical discussion of core topics and readings and case analysis will be used for instruction.

**GENC 6210  Professional Issues in Genetic Counseling I** 2.0 cr.
C. Walton, M.S.  – (Fall) Prereq: GENC 6101, GENC 6105, GENC 6110. Course Restrictions: Second year student in Genetic Counseling M.S. Program.

First course in a two course sequence regarding professional practice issues of master’s level genetic counselors. The fall semester course focuses on professional standards, professional ethics, legal principles and health systems and policy issues relevant to genetic counselors.

**GENC 6211  Professional Issues in Genetic Counseling II** 2.0 cr.
C. Walton, M.S.  – (Spring) Prereq: GENC 6210. Course Restrictions: Second year student in Genetic Counseling M.S. Program.

Second course in a two course sequence regarding professional practice issues of master’s level genetic counselors. The Spring semester course focuses on disability issues, cultural competency, public health genetics, research methods in genetic counseling, and professional roles.

**GENC 6250  Risk Calculation in Genetic Counseling** 1.0 cr.
C. Walton, M.S.  – (Fall) Prereq: GENC 6110, GENC 6120. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program.

This course covers pedigree analysis and risk calculation principles used by genetic counselors in clinical practice.

**GENC 6910  Applied General Genetics Clinic I** 3.0 cr.
C. Walton, M.S.  – (Fall, Spring, Summer) Prereq: GENC 6101, GENC 6105, GENC 6110. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program.

This is a clinical rotation for Genetic Counseling M.S. students through a general genetics clinic serving a variety of referral indications. Students will learn and practice case management, history taking, risk assessment, counseling, and client advocacy skills.

**GENC 6911  Applied Prenatal Genetics Clinic II** 3.0 cr.
C. Walton, M.S.  – (Fall, Spring, Summer) Prereq: GENC 6101, GENC 6105, GENC 6110. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program.

This is a clinical rotation for genetic counseling students through a prenatal diagnosis and genetics clinic. Students will learn/practice history taking, risk assessment, patient education and genetic counseling, case management, as well as observe prenatal diagnosis and ART procedures.

**GENC 6912  Applied Metabolic Genetics Clinic** 3.0 cr.
C. Walton, M.S.  – (Fall, Spring, Summer) Prereq: GENC 6101, GENC 6105, GENC 6110. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program.

This is a clinical rotation for genetic counseling students through a genetics clinic for inborn errors of metabolism. Students will work with patients referred for diagnostic evaluation, medical/nutritional management of specific conditions, follow-up of positive newborn metabolic screening results.

**GENC 6913  Applied Regional & Specialties Genetics Clinics** Variable cr.
C. Walton, M.S.  – (Fall, Spring, Summer) Prereq: GENC 6101, GENC 6105, GENC 6110. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program.

This is a clinical rotation for genetic counseling students through regional outreach genetics clinics and specialty/multidisciplinary clinics serving patients with various genetic conditions.

**GENC 6914  Applied Hereditary Cancer Clinic** 1.0 cr.
C. Walton, M.S.  – (Fall, Spring, Summer) Prereq: GENC 6110, PEDS 6601, PEDS 6602. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program.

This is a clinical rotation for genetic counseling students through a hereditary cancer clinic for individuals seeking genetic counseling and testing for genetic cancer predisposition syndromes.

**GENC 6915  Applied Adult Medical Genetics Clinic** 1.0 cr.
C. Walton, M.S.  – (Fall, Spring, Summer) Prereq: GENC 6101, GENC 6105, GENC 6110. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program.

This is a clinical rotation for genetic counseling students through a medical genetics clinic and clinical research settings providing diagnosis, management, risk assessment and genetic counseling for adults.

**GENC 6919  Applied Medical Genetics Clinic – Clinical Elective** Variable cr.
C. Walton, M.S.  – (Fall, Spring, Summer) Prereq: GENC 6101, GENC 6105, GENC 6110. Course Restrictions: Matriculated student in Genetic Counseling M.S. Program.
This is an elective clinical rotation for genetic counseling students desiring to arrange training in settings outside of core required clinical rotations or an additional, advanced rotation.

**GENC 6950  Masters Thesis**  
Variable cr.  
C. Walton, M.S.  – (Fall, Spring, Summer).  Course Restrictions: Matriculated student in Genetic Counseling M.S. Program

Masters thesis research to be arranged with prior approval of the Graduate Program in Genetic Counseling.

### HUMAN MEDICAL GENETIC

**HMGP 7600  Survey of Human Genetics**  
2.0 cr.  
Dr. R. Spritz - (Spring)  
Survey of human genetics, including Mendelian and other types of inheritance, chromosomes and cytogenetics, molecular and biochemical basis of genetic disease, quantitative genetics and gene mapping, developmental and cancer genetics, clinical genetics, and genetic screening and prenatal diagnosis.

**HMGP 7610  Topics in Human Genetics**  
1.0 cr.  
Dr. R. Spritz - (Fall, Spring)  
Prereq: Graduate standing.  
Two-semester course based on weekly HMGP seminar series.  Students meet with speakers and discuss seminar or related topics and arranged readings.  Grade based on class participation and required paper and presentation.  Required for 1st and 2nd year HMGP students.

**HMGP 7620  Genomics**  
2.0 cr.  
Dr. J. Sikela - (Spring)  
The goal of this course is to provide a thorough coverage of the field of genomics, including genome sequencing and mapping, bioinformatics, DNA chips, comparative genomics, human DNA variation, medical genomics, pharmacogenomics, and ethical issues arising from genome-based knowledge.

**HMGP 7630  Independent Study in Human Medical Genetics**  
Variable cr.  
Dr. R. Spritz - (Fall, Spring, Summer)  
Independent study is intended to permit students to carry out directed reading and discussion with a specific faculty member other than their thesis advisor. Consent of the faculty member offering the independent study and the program director are required.

**HMGP 7650  Research in Human Medical Genetics**  
Variable cr.  
Dr. R. Spritz - (Fall, Spring, Summer)  
Research work in human medical genetics.

**HMGP 8990  Doctoral Thesis**  
Variable cr.  
Dr. R. Spritz - (Fall, Spring, Summer)  
Doctoral thesis work in human medical genetics.

### IMMUNOLOGY

**IMMU 7602  Special Topics in Tumor Immunology**  
1.0 cr.  
Dr. J. Slansky - (Spring) Prereq: IMMU 7662.  
This interactive course, elucidates mechanisms and paradigms relevant to the immune response to tumors. Current research and future directions in the field are discussed.  Students are assessed via presentations, participation, and an exam.

**IMMU 7603  Special Topics in Clinical Immunology**  
1.0 cr.  
Dr. R Torres – (Spring) Prereq: IMMU 7662.  
Course covers selected topics (8 total) encompassing a wide range of topics in clinical immunology and will provide insight into immunologically – mediated human diseases and the prospect of new immuno-therapies. Format includes presentation by lecturer, student presentation and class participation.

**IMMU 7604  Special Topics in Signal Transduction in the Immune System**  
1.0 cr.  
Dr. A-L Perraud - (Spring) Prereq: IMMU 7662, IMMU 7602.  
In-depth course, designed primarily for immunology graduate students in their second year, who have completed IMMU 7602.  The course covers selected topics (8 in all) encompassing wide range of topics in signal transduction through receptors important in the immune system.

**IMMU 7607  Science as a Profession**  
1.0 cr.  
Dr. P. Marrack - 303-398-1307.  (Fall)
This course discusses ethical issues, conflicts of interest, and regulations for working with humans or animals. It also includes instruction on writing papers and grants, giving effective presentations and advice on finding jobs in academia and industry.

**IMMU 7630  Overview of Immunology**  
2.0 cr.  
Dr. J.J. Cohen - (Fall)  
An overview course in immunology for non-Immunology-program graduate students. The focus is human relevance and the practical use of immunology in a variety of fields. Students gain experience applying immunological knowledge to their own area of interest.

**IMMU 7650  Research in Immunology**  
Variable cr.  
Dr. R. Torres – (Fall, Spring, Summer) Prereq: Consent of instructor.  
Research work in immunology.

**IMMU 7662  Immunology**  
6.0 cr.  
Dr. D. Riches - (Spring)  
This course covers the basic principles of the immune system. Included are discussions on (i) the innate and adaptive immune responses, (ii) the molecular and cellular basis of immune specificity and (ii) aspects of clinical immunology.

**IMMU 8990  Doctoral Thesis**  
Variable cr.  
Dr. R. Torres – (Fall, Spring, Summer). Prereq: Consent of instructor  
Doctoral thesis work in immunology.

**INTERDEPARTMENTAL**

**IDPT 5600  Topics in Biomedical Science and Research**  
4.0 cr.  
Dr. S. Flores - (Summer)  
Research internship for undergraduate fellows in Graduate Experiences for Multicultural Students (GEMS) program.

**IDPT 7200  Scientific Writing for Doctoral Students**  
2.0 cr.  
Dr. D. Wilkerson - (Spring) Prereq: Must have passed preliminary examination; consent of instructor.  
Scientific writing course for students engaged in research. Focuses on critical thinking, analytical writing, and oral presentation. Taught as a writing workshop, the course emphasizes effective communication with both professional and non-technical audiences.

**IDPT 7300  Technology Transfer and Biotechnology**  
3.0 cr.  
Dr. A. Meyers - (Fall, Spring)  
The purpose of this course is to inform students about the process of technology transfer, from academic discovery and invention to commercialization of a product.

**IDPT 7645  MSTP Seminar**  
1.0 cr.  
Dr. A. Ribera  -  (Fall, Spring)  
Designed to expose MSTP and physician scientist students to research programs and opportunities in biomedical sciences at the UCD Anschutz Medical campus and selected departments of the UC Boulder campus.

**IDPT 7646  Tissue Biology and Disease Mechanism**  
3.0 cr.  
Dr. J. Hooper - (Spring) Prereq: IDPT 7801, IDPT 7802 & IDPT 7803.  
This course provides an overview of organ systems and disease through 1) a survey of the major systems, including the cellular and molecular mechanisms underlying their function and repair, integrated with 2) common diseases, current therapies, and their mechanistic basis.

**IDPT 7650  Research in Biomedical Sciences**  
Variable cr.  
Dr. D. Bentley - (Fall, Spring, Summer) Prereq: Consent of instructor.  
Research rotation for students in the biomedical sciences Ph.D. program.

**IDPT 7651  Summer Research Rotation**  
Variable cr.  
Dr. A. Gutierrez-Hartmann - (Summer) Prereq: Acceptance into the MST Program and permission of MSTP Director.  
This course is an 8-10 week laboratory rotation experience in an MSTP training laboratory.

**IDPT 7652  MSTP Advanced Topics**  
Variable cr.  
Dr. A. Ribera - (Fall, Spring) Prereq: IDPT 7801, IDPT 7802, IDPT 7803; consent of instructor.  
This course is designed for students in the MSTP and consists of in-depth small group (1-7 students) sessions that provide in-depth didactic and/or paper readings on subjects related to research rotations or thesis projects.

**IDPT 7655  Thesis Years – Foundations of Doctoring**  
1 cr.  
Dr. A. Gutierrez-Hartmann - (Fall, Spring) Prereq: All Phase I and II SOM courses.
This course intended for MD or MD-PhD students who have successfully completed all coursework for Phases I and II of SOM curriculum, are on leave of absence from SOM and wish to maintain clinical exposure and training during the leave.

**IDPT 7801  Biomedical Sciences Core Course I**  
Faculty – (Fall)  
Unified presentation of fundamental principles of biochemistry, cell biology, genetics, and molecular biology. Designed for all first-year basic sciences graduate students.

**IDPT 7802  Biomedical Sciences Core Course II**  
Faculty – (Fall)  
Unified presentation of fundamental principles of biochemistry, cell biology, genetics, and molecular biology. Designed for all first-year basic sciences graduate students. Continuation of IDPT 7801.

**IDPT 7803  Biomedical Sciences Core Course III**  
Faculty - (Fall)  
Unified presentation of fundamental principles of biochemistry, cell biology, genetics, and molecular biology. Designed for all first-year basic sciences graduate students. Continuation of IDPT 7802.

**IDPT 7805  Case Studies: Molecules to Medicine**  
Dr. A. Ribera – (Fall) Crosslisted: IDPT 5002  Prereq: IDPT 7801, IDPT 7802, IDPT 7803  Coreq: IDPT 7801, IDPT 7802, IDPT 7803  
This course is targeted for first year MSTP/Physician-Scientist students. Clinical cases will be presented/discussed by faculty and students to provide clinical context for basic science principles taught in the graduate core courses (IDPT 7801, IDPT 7802 and IDPT 7803).

**MICB 7650  Research in Microbiology**  
Variable cr.  
Dr. J. Schaack - (Fall, Spring, Summer) Prereq: Consent of instructor. Research work in microbiology.

**MICB 7701  Molecular Virology and Pathogenesis**  
3.0 cr.  
Dr. J. Schaack - (Spring) Prereq: IDPT 7803 or consent of instructor. Molecular principles of viral pathogenesis. Topics include virus-host interactions, infectious diseases, cancer and virus replication. Students are assessed via in-class presentations, class participation and a written exam.

**MICB 7702  Molecular Mechanisms of Bacterial Disease**  
2.0 cr.  
Dr. R. Gill - (Spring) Prereq: IDPT 7803 or consent of instructor. Course will provide an introduction to the biology of pathogenic bacteria and an in-depth discussion of several paradigms of bacterial diseases which will illustrate important concepts and molecular mechanisms of bacterial pathogenesis and evasion of the host defenses.

**MICB 7703  Contemporary Topics in Molecular Bacteriology**  
1.0 cr.  
Dr. R. Gill - (Spring) Prereq: IDPT 7803 or consent of instructor. Lecture and discussion course. Topics may include: biochemical/genetic control of bacterial cell cycle, growth rate and cellular differentiation signal transduction and responses to environmental stimuli, genetic regulation of microbial pathogenesis. Students assessed via in-class presentations, class participation, and written exam.

**MICB 7704  Host Response to Infectious Disease**  
2.0 cr.  
Dr. L. VanDyk - (Spring) Prereq: IDPT 7803 or consent of instructor. This interactive graduate course, which provides an overview and specific examples of the host response to infectious disease. Current research and future directions in the field are discussed. Students are assessed via presentations, participation, and an exam.

**MICB 7705  Medical Microbiology**  
4.0 cr.  
Dr. R. Gill - (Fall) Prereq: Consent of instructor. Course introduces students to certain fundamental features of microorganisms and their ability to cause disease. Topics include: molecular-cellular aspects of bacterial structure; specific properties of pathogenic bacteria; properties of viruses; diseases caused by viral agents. Students assessed by written exams.

**MICB 8990  Doctoral Thesis**  
Variable cr.  
Dr. J. Schaack - (Fall, Spring, Summer)  
Doctoral thesis work in microbiology.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
<th>Prerequisites</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOLB 7616</td>
<td>Topics in Molecular and Cellular Biology</td>
<td>1.0 cr.</td>
<td>Dr. J. Kieft</td>
<td>(Spring) Prereq: IDPT 7801, IDPT 7802, IDPT 7803.</td>
<td>Various topics in molecular and cellular biology will be selected every year. Each topic will be studied by a faculty lecture and group presentations by graduate students of research papers.</td>
</tr>
<tr>
<td>MOLB 7650</td>
<td>Research in Molecular Biology</td>
<td>Variable cr.</td>
<td>Dr. J. Kieft</td>
<td>(Fall, Spring, Summer) Prereq: Consent of the instructor.</td>
<td>Research work in molecular biology.</td>
</tr>
<tr>
<td>MOLB 7661</td>
<td>Molecular Biology Seminar</td>
<td>1.0 cr.</td>
<td>Dr. J. Kieft</td>
<td>(Spring, Summer)</td>
<td>Seminar series provides a forum for the presentation of scientific experiments and information in molecular biology by faculty, postdoctoral fellows, graduate students and invited outside guest speakers.</td>
</tr>
<tr>
<td>MOLB 7800</td>
<td>Advanced Topics in Molecular Biology</td>
<td>Variable cr.</td>
<td>Dr. J. Kieft</td>
<td>(Spring) Prereq: IDPT 7801, IDPT 7802, IDPT 7803.</td>
<td>Course instructs graduate students how to critically evaluate scientific literature. Course in 4 blocks, topics include nucleic acid, chromatin structure, DNA replication, RNA transcription, RNA processing, cell cycle control, genetics of model organisms. Papers chosen by instructors, presentations by students.</td>
</tr>
<tr>
<td>MOLB 8890</td>
<td>Doctoral Thesis in Molecular Biology</td>
<td>Variable cr.</td>
<td>Dr. J. Kieft</td>
<td>(Fall, Spring, Summer)</td>
<td>Doctoral thesis work in molecular biology.</td>
</tr>
<tr>
<td>NRSC 7600</td>
<td>Cellular &amp; Molecular Neurobiology</td>
<td>3.0 cr.</td>
<td>Dr. N. Schoppa</td>
<td>(Fall)</td>
<td>A comprehensive, in-depth, discussion-based course intended for candidates for the PhD in Neuroscience. Topics include ion channel structure and function, ionic basis of the resting and action potential, and the biochemistry and physiology of direct and indirect synaptic transmission.</td>
</tr>
<tr>
<td>NRSC 7605</td>
<td>Directed Studies in Biomedical Science</td>
<td>8.0 cr.</td>
<td>Dr. D. Restrepo</td>
<td>(Fall)</td>
<td>Unified presentation of fundamental principles of biochemistry, cell biology, genetics, and molecular biology. Designed for all first-year basic sciences graduate students. Students will take 80% of the lectures in IDPT 7801, IDPT 7802 and IDPT 7803.</td>
</tr>
<tr>
<td>NRSC 7610</td>
<td>Fundamentals of Neurobiology</td>
<td>4.0 cr.</td>
<td>Dr. T. Finger</td>
<td>(Spring) Prereq: NRSC 7600 or equivalent at the discretion of the instructors.</td>
<td>This course will provide basic knowledge on the structure and function of the nervous system. The lectures will be supplemented by discussion of primary research literature in neurobiology.</td>
</tr>
<tr>
<td>NRSC 7614</td>
<td>Molecular Basis of Neuro-psychiatric Disorders</td>
<td>2.0 cr.</td>
<td>Dr. S. Leonard</td>
<td>(Spring) Prereq: IDPT 7802 or BMGN 5000/CSBI 5001.</td>
<td>This elective, for basic sciences graduate students and medical students, provides a survey of current clinical and molecular aspects of human neuropsychiatric disorders. Both movement disorders and DSMIV diagnoses will be covered. Contact Course Director for a list of topics.</td>
</tr>
<tr>
<td>NRSC 7615</td>
<td>Developmental Neurobiology</td>
<td>3.0 cr.</td>
<td>Dr. A. Ribera</td>
<td>(Spring) Prereq: IDPT 5004, NRSC 7600 &amp; NRSC 7610.</td>
<td>This course will cover fundamental principles regarding development of the nervous system. The format of the course will consist of lecture plus reading of primary literature.</td>
</tr>
<tr>
<td>NRSC 7650</td>
<td>Research in Neuroscience</td>
<td>Variable cr.</td>
<td>Dr. D. Restrepo</td>
<td>(Fall, Spring, Summer) Prereq: Consent of instructor.</td>
<td>Research work in neuroscience.</td>
</tr>
<tr>
<td>NRSC 7661</td>
<td>Grant Proposal Writing Workshop</td>
<td>1.0 cr.</td>
<td>Dr. R. Levinson</td>
<td>(Spring) Prereq: NRSC 7610.</td>
<td>Students will examine various proposal types/formats, then write their own proposal in the format of NRSA fellowship application. Restricted to students with adequate neuroscience background.</td>
</tr>
<tr>
<td>NRSC 7670</td>
<td>Advanced Topics in Neuroscience</td>
<td>1.0 cr.</td>
<td>Dr. D. Restrepo</td>
<td>(Fall) Prereq: NRSC 7600 or consent of instructor.</td>
<td>Students will be guided in developing two class sessions in systems neuroscience to be presented in the Systems Neuroscience course, NRSC 7610. Each session will include a practice presentation and post-mortem critique.</td>
</tr>
</tbody>
</table>
NRSC 7800  Teaching Neuroscience  1.0 cr.
Dr. D. Restrepo – (Spring)  Prereq: NRSC 7610  Course Restrictions: Second year students in neuroscience or above.
The course will consist of discussion of manuscripts relevant to a specific topic in neuroscience.

NRSC 8990  Doctoral Thesis  Variable cr.
Dr. D. Restrepo -  (Fall, Spring, Summer)  Prereq: Consent of instructor
Doctoral thesis work in neuroscience.

PHARMACOLOGY

PHCL 7560  Drug Metabolism & Pharmacogenetics I  1.0 cr.
Dr. V. Vasiliou - (Fall)  Crosslisted: TXCL 7560.
Course will focus on reactions that exogenous compounds undergo in mammalian systems and mechanisms of these reactions. Enzyme kinetics and unusual (idiosyncratic) drug responses that have a hereditary basis and the interrelationship between genes and drug metabolism will be discussed.

PHCL 7561  Drug Metabolism and Pharmacogenetics II  2.0 cr.
Dr. V. Vasiliou - (Spring)  Crosslisted: TXCL 7561.
Course will focus on reactions that exogenous compounds undergo in mammalian systems and mechanisms of these reactions. Enzyme kinetics and unusual (idiosyncratic) drug responses that have a hereditary basis and the interrelationship between genes and drug metabolism will be discussed.

PHCL 7600  Frontiers in Pharmacology  1.0 cr.
Dr. T. Kutateladze - (Fall)
Course is intended to introduce students to cutting-edge pharmacology research and to the range of research opportunities available within the Pharmacology Training Program. Pharmacology Department faculty presentations will focus on cellular signaling, molecular mechanisms of drug actions, structure-based drug design.

PHCL 7605  Ethics in Research  1.0 cr.
Dr. J. Sikela – (Fall)
The Department of Pharmacology in the UCD School of Medicine organizes and offers an interactive course entitled “Ethics in Research”. The course is designed to inform/sensitize students, trainees, faculty to problems of fraud, misconduct and unethical practices in scientific research.

PHCL 7606  Receptors and Cell Signaling  3.0 cr.
Dr. M. Dell’Acqua - (Spring)  Prereq: IDPT 7801, IDPT 7802, IDPT 7803.
This elective course presents an in-depth treatment of the role of receptors and signal transduction systems in the regulation of cell functions through faculty-presented lectures and student-led discussions of current literature.

PHCL 7609  Statistical Methods in Pharmacology  2.0 cr.
Dr. J. Sikela – (Spring)
This introductory course is designed to provide students in the biological and health sciences with the knowledge and skills to analyze and interpret data.

PHCL 7610  Survey of Bioinformatics Methods  2.0 cr.
Dr. L. Hunter - (Fall)  Crosslisted: BIOI 7710.
What is Bioinformatics and why study it? How is large-scale molecular biology data generated, where and how can researchers gain access to it, and what computational analyses are possible?

PHCL 7611  Bioinformatics I  4.0 cr.
Dr. L. Hunter - (Fall)  Crosslisted: BIOI 7711.
What is Bioinformatics and why study it? How is large-scale molecular biology data generated, where and how can researchers gain access to it, what computational analyses are possible and computational techniques for solving inference problems in molecular biology?

PHCL 7612  Bioinformatics II  4.0 cr.
Dr. L. Hunter - (Spring)  Crosslisted: BIOI 7712.
Prereq: BIOI 7711
Inference problems and computational techniques for molecular biology, with emphasis on machine learning approaches. Use of computational induction techniques focused on information extraction from biomedical literature, inference of biochemical networks from high-throughput data, and prediction of protein function.

PHCL 7614  Membrane Biophysics  2.0 cr.
Dr. T. Benke - (Spring)  Crosslisted: NRSC 7614.
Prereq: NRSC 7600 or equivalent
Lectures and homework on ionic mechanisms underlying cellular excitability, especially in the central nervous system. Descriptive mathematics, pharmacology and molecular biology will be stressed. An introductory application to real-life problems using the NEURON simulation environment will be taught.
PHCL 7620  **Principles of Pharmacology**  6.0 cr.
Dr. J. Sikela – (Spring) Prereq: IDPT 7801, IDPT 7802, IDPT 7803. Consent of course directors.
Lectures are provided in the general areas of pharmacokinetics, receptor theory, structure-activity relationships, drug metabolism, basic pharmacological mechanisms with a particular emphasis on systems such as the nervous system and cardiovascular system, as well as cancer and microbial chemotherapy.

PHCL 7622  **Principles of Pharmacology for MSTP Students**  1.0 cr.
Dr. J. Sikela – (Spring) Prereq: IDPT 7801, IDPT 7802, IDPT 7803, PHCL 6000, or new equivalent. Consent of course directors required.
Lectures are provided in the general areas of pharmacokinetics, receptor theory, structure-activity relationships, drug metabolism, and basic pharmacological mechanisms with a particular emphasis on systems such as the nervous system and cardiovascular system, as well as cancer and microbial chemotherapy.

PHCL 7650  **Research in Pharmacology**  Variable cr.
Dr. J. Sikela – (Fall, Spring, Summer) Prereq: Consent of instructor.
Research work in pharmacology.

PHCL 7660  **Advanced Topics in Pharmacology**  1.0 cr.
Dr. D. Port – (Fall, Spring, Summer) Prereq: PHCL 7600, PHCL 7606, PHCL 7609, PHCL 7620, PHCL 7650. Coreq: IDPT 7801, IDPT 7802, IDPT 7803
An in-depth discussion-oriented course for advanced students focusing each term on specific topics associated with pharmacological studies including new insights about drug addiction; alcohol actions and alcoholism memory models and LTP; rational approaches to cancer chemotherapy; cardiovascular physiology.

PHCL 8990  **Doctoral Thesis**  Variable cr.
Dr. J. Sikela – (Fall, Spring, Summer) Prereq: Consent of instructor.
Doctoral thesis work in pharmacology.

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**PHARMACEUTICAL SCIENCES**

PHSC 7310  **Fundamentals of Pharmaceutical Sciences**  3.0 cr.
Dr. D. Bain -  (Fall) Crosslisted TXCL 7310
Core course explores key aspects of Pharmaceutical Sciences. Major themes will focus on macromolecular interactions, pharmaceutics, pharmacokinetics, pharmacodynamics, apoptosis, signal transduction and immunology. Critical thinking and problem solving skills will be emphasized via lectures, discussions, and computer-based data analyses.

PHSC 7325  **Pharmaceutical Development: Evaluating the External Environment**  2.0 cr.
Dr. R. Valuck -  (Summer) An overview of pharmaceutical industry in U.S. and the environment in which it exists. Material covered includes: epidemiology/classification of disease; trends in health care costs/expenditures; organization/financing of health care; pharmaceutical industry characteristics; drug product marketing and introduction to pharmaceutical outcomes/economics.

PHSC 7330  **Issues in Drug Development**  2.0 cr.
Dr. J. Carpenter - (Spring) Prereq: Consent of instructor.
A multidisciplinary approach to educating students about all aspects of drug development including federal drug regulatory issues, natural product screening, combinatorial chemistry, high throughput screening, in vitro and in vivo pharmacology models, preclinical/clinical toxicology, dosage forms, and clinical trials design.

PHSC 7339  **Human Subjects Ethics**  1.0 cr.
Dr. A. Prochazka - (Spring) An overview of the field of ethics in clinical research. It is designed for non-Clinical Science degree students and certificate students and investigators who will be conducting research involving human subjects. Topics include the historical background and current regulations.

PHSC 7345  **Principles of Drug Delivery**  2.0 cr.
Dr. T. Anchordoquy - (Spring) This class is taught jointly by faculty in the School of Pharmacy and the School of Medicine. The course will introduce students to the basic principles that are fundamental to drug delivery with a special emphasis on targeted drug delivery.

PHSC 7350  **Proteins**  3.0 cr.
Dr. R. Hodges – (Spring) Crosslisted: BMST 7350.
Chemical and physical basis for protein structure, folding, function and stability; role of molecular dynamics, use of molecular simulations in investigations of protein-ligand and protein interactions; methods and principles of protein/peptide purification and enzyme catalysis, including electron transfer and mutagenesis.

PHSC 7354  **Structural Analysis of Bio-molecules I**  2.0 cr.

*University of Colorado Denver Health Sciences Programs 2008-2009*
Dr. R. Hodges – (Fall) Crosslisted: BMST 7354  
This course describes the fundamentals of spectroscopic methods used to study protein structure and function. These techniques include optical methods (CD spectroscopy, fluorescence and absorbance), vibrational methods (IR and ESR), analytical ultracentrifugation, mass spectrometry, calorimetry, light scattering and Biacore analysis.

**PHSC 7400 Ethical Issues in Toxicology & Pharmaceutical Sciences**  
Dr. R. Agarwal -  (Fall) Crosslisted: TXCL 7400.  
The purpose of this course is to expose students to ethical issues in the fields of toxicology and pharmaceutical sciences. Emphasis will be placed on research conduct, animal use, and other timely issues relevant in these fields.

**PHSC 7450 Protein Chemistry 2**  
Dr. J. Carpenter -  (Spring) Crosslisted: BMST 7450.  
This course represents methods/principles of protein/peptide purification and enzyme catalysis, including electron transfer/mutagenesis. In addition, the investigation of protein and enzyme structure/function, the role of molecular dynamics, and use of molecular stimulations in investigations of protein-ligand interactions will be presented.

**PHSC 7454 Structural Analysis of Bio-molecules 2**  
Dr. R. Hodges – (Spring)  
Methods and strategies for determination of the primary and 3-dimensional structures of biologically important molecules. Crystallography, nuclear magnetic resonance spectroscopy and mass spectrometry will be taught in structural determination of proteins, nucleic acids complex carbohydrates, and lipid molecules.

**PHSC 7530 Cancer: Experimental and Medical Aspects**  
Dr. A. Malkinson  - (Spring) Prereq: Consent of course coordinator.  
This is an interactive seminar course on recent topics in cancer biology. Topics include biochemical/morphological description of tumors and tumor behavior, such as metastasis and angiogenesis, and tumor development. This course also covers aspects of carcinogenesis: mechanisms, modulation, testing/epidemiology, chemotherapy.

**PHSC 7561 Pharmacology of Anticancer Agents**  
Dr. G Eckhardt - (Fall)  
This is a course that will examine the principles behind the pharmacological treatment of cancer. Focus will be on the agents currently used in the clinic as well as developing therapies. Mechanistic aspects and therapeutic strategies will be emphasized.

**PHSC 7568 Seminar in the Pharmaceutical Sciences**  
Dr. T. Anchordoquy - (Fall, Spring)  
Discusses current literature and research in the pharmaceutical sciences. The only revision for this course is that the maximum credit hours possible will be three.

**PHSC 7651 Pharmaceutical Biotechnology**  
Dr. T. Randolph - (Fall) Crosslisted: CU Boulder CHEN 5900.  
Course covers role of bioengineering in development of pharmaceutical biotechnology products. In particular, the student will learn to apply solution thermodynamics as well as mass and heat transfer concepts to the stabilization/formulation of macromolecules and production of drug delivery systems.

**PHSC 7652 Principles of Medicinal Chemistry**  
Dr. J. Ruth - (Fall) Prereq: One-year organic chemistry with lab one semester of biochemistry.  
This survey course covers organic chemistry of drugs with respect to drug action: mechanism of action, structure-activity relationships, metabolism, dosage forms and rational drug design. Course encompasses traditional therapeutic categories of drugs as well as selected topics from current literature.

**PHSC 7653 Protein Formulation**  
Dr. J. Carpenter - (Spring)  
This course will provide instruction in rational design of stable therapeutic protein formulations with emphasis on the practical and mechanistic aspects of developing aqueous solution and freeze-dried formulations. Students will read papers from the literature and participate in critical discussions.

**PHSC 7654 Advanced Topics in Pharmacology**  
Dr. T. Anchordoquy - (Fall, Spring) Course Restrictions: Permission from Instructor/Program Director.  
Considers special topic of current interest in pharmacology. Course may be repeated for credit with the instructor’s approval.

**PHSC 7657 Advanced Topics in Medicinal Chemistry**  
Dr. J. Ruth - (Fall, Spring) Prereq: Consent of instructor.
Considers special topic of current interest in medicinal chemistry. Course may be repeated for credit with the instructor’s approval.

**PHSC 7658  Advanced Topics in Pharmaceutical Sciences**  
Variable cr.  
Dr. T. Anchordoquy - (Fall, Spring). Prereq: Consent of instructor  
Considers special topic of current interest in pharmaceutical sciences. Course may be repeated for credit with instructor’s approval.

**PHSC 7660  Membrane Dynamics**  
2.0 cr.  
Dr. T. Anchordoquy - (Spring)  
This course will cover the basics of membrane bioenergetics in biological systems. The physical properties of membranes are described based on studies with liposomes, and the course further explores the use of liposomes as drug delivery vehicles.

**PHSC 7831  Case Studies in Biotechnology**  
2.0 cr.  
Dr. D. Kompala – (Spring) Crosslisted: CU Boulder CHEN 5831.  
Course is required of all graduate students in interdisciplinary graduate biotechnology certificate program and those supported on NIH training grants. Reviews molecular genetics, product synthesis/purification, economics, intellectual property, and business planning. Working in teams, students present a biotechnology product plan.

**PHSC 8990  Doctoral Thesis**  
Variable cr.  
Dr. T. Anchordoquy - (Fall, Spring, Summer)  
Doctoral thesis work in pharmaceutical sciences.

**PHSL 7650  Research in Physiology and Biophysics**  
Variable cr.  
Dr. S. Vijayaraghavan – (Fall, Spring, Summer) Prereq: Consent of instructor.  
Research work in Physiology and Biophysics

**PHSL 7651  Advanced Topics in Cell Signaling**  
1.0 cr.  
Dr. N. Schoppa – (Fall, Spring, Summer) Prereq: Consent of instructor.  
Students select topics of interest in the area of cell signaling and receive one-on-one instruction from expert faculty. Each one-credit topic will be taught for 5 weeks. Course work will include reading and discussing papers, as well as practical exercises.

**PHSL 8990  Doctoral Thesis**  
Variable cr.  
Dr. S. Vijayaraghavan – (Fall, Spring, Summer) Prereq: Consent of instructor.  
Doctoral thesis work in physiology.

**PHYSIOLOGY**

**PRMD 6600  Introduction to Public Health**  
2.0 cr.  
Dr. K. Kennedy – (Summer)  
This course examines the historical and conceptual bases of public health, the key issues and problems faced by the public health system, and the tools available for the protection and enhancement of the public’s health.

**PRMD 6602  Healthy People 2010**  
1.0 cr.  
Dr. C. DiGuiseppi – (Summer)  
The student will understand the development of Healthy People 2010, its organization and content, compare ways that different states use Healthy People 2010 and critically analyze a focus area or objective.

**PRMD 6603  Health Care Systems**  
2.0 cr.  
Dr. P. Barton – (Fall)  
The first of a two-semester sequence to introduce students to U.S. health care system from organizational/political/social/service delivery perspective. Students introduced to basic components of current health care system, basic economic principles as applied to selected aspects of health care system.

**PRMD 6604  Health Care Economics**  
2.0 cr.  
Dr. D. Milne – (Spring) Prereq: PRMD 6603.  
This course is a sequel to PRMD 6603 focusing on health care financing and economic issues. A microeconomics framework, including issues of supply, demand, market structure, market failure, price and output are discussed as they apply to the health sector.

**PRMD 6605  Health Policy**  
2.0 cr.
J. Glazner – (Spring) Prereq: PRMD 6603
The focus of this course will be the analysis of important U.S. health policy issues, such as access, cost and quality. Analytic concepts, approaches and frameworks will be used to explore specific significant health policy issues.

PRMD 6606 Community Health Practice: Administration Policies and Politics 3.0 cr. *
Faculty – (Fall, Spring) Prereq: PRMD 6603 and PRMD 6604 or PRMD 6603 and PRMD 6605.
*Offered as 1.0 credit hour Fall term and 2.0 credit hour Spring term for a total of 3.0 credit hours.
Course designed to present technical, policy and administrative issues within context of operational activities of community and public health agencies. Introduction to basic management skills is included. Each student will participate in community agency problem solving or needs assessment activity.

PRMD 6607 Current Legal Issues in Health Care 2.0 cr.
D. Matthew – (Spring)
This elective will explore American health care policy. Particular emphasis will be placed on the provider’s role in addressing issues of justice in health care delivery and the legal tools available to policy makers.

PRMD 6608 Ethical and Legal Issues in Public Health, Health Policy, Epidemiology 2.0 cr.
Dr. J. Glover – (Spring)
Course explores ethical/legal dimensions of various topics of concern in areas of public health, health policy, epidemiology. Topics: health care reform, medical indigence, screening/genetic screening, epidemiological research, QUALYS and health outcomes research, public health/individual rights, public health in developing countries.

PRMD 6609 Cost Benefit and Effectiveness in Health 3.0 cr.
Dr. S. Eisert – (Summer)
This is an intermediate level course on the theory, methods and application of economic evaluation in the health context. Students are required to conduct an economic evaluation by collecting data and information related to a health program of interest.

PRMD 6610 Social and Community Factors in Health 3.0 cr.
Dr. J. Swift – (Spring)
Course considers the social/community factors affecting health status, seeking and providing health care. Cross-cultural concepts of health and disease are reviewed. The measurement of selected social/psychological factors, including demographic, socioeconomic and life style indicators and use in epidemiological studies emphasized.

PRMD 6611 Use of Theory in Public Health Research and Practice 3.0 cr.
Dr. L. Crane – (Fall)
Course will cover basic theories, concepts, models from a range of social/behavioral disciplines used in public health research and practice. Applications of theoretical frameworks in specifying multiple targets and levels of intervention to public health research will be addressed.

PRMD 6612 Program Evaluation 2.0 cr.
Dr. L. Crane – (Spring)
Provides students with understanding of role of systematic evaluation in assessing effectiveness of public health programs/policies. Includes theoretical concepts and methodology. Topics to be examined include: needs assessment, process and outcome evaluation, qualitative/quantitative research designs, and data collection methodologies.

PRMD 6614 Occupational and Environmental Health 3.0 cr.
Drs. J. Litt - (Spring) Prereq: PRMD 6630
Presents an overview of information needed to assess the relationship between the environment, workplace and health. Topics include facets of industrial hygiene, air and water pollution, radiation monitoring, toxicology studies, clinical occupational medicine, and biologic monitoring. The emphasis throughout is on the epidemiologic link between exposure and health with a discussion of study methods and interpretation specific to the areas.

PRMD 6615 Topics in Occupational/Environmental Medicine: A Problem-based Approach 2-3 cr.
Dr. K. Mueller – (Fall, Spring, Summer) Prereq; PRMD 6614, PRMD 6630
Students presented with series of problems that focus on industries/environmental problems in Denver metropolitan area. The solutions to the problems involve visiting industries, consulting with experts, and learning the principles and practice of toxicology, industrial hygiene, and occupational epidemiology.

PRMD 6617 Introduction to Health Services Research 2.0 cr.
Dr. P. Barton - (Fall) Prereq: PRMD 6603 and 6604.
Course provides overview of the discipline of health services research (HSR); it is designed for individuals who have completed MSPH prerequisites. Course focuses on four major HSR dimensions and will dedicate two class sessions to each: organizing, financing, delivery, outcomes.

PRMD 6619 Perspectives in International Health 2.0 cr.
Dr. P. Barton - (Fall)
Review of health care issues and the ways in which various national health care systems are organized or have evolved to deal with these issues. The role of governmental, multi-governmental, philanthropic, voluntary, industrial organizations in international health area are examined.

PRMD 6620  Survey Research  2.0 cr.
Dr. L. Crane – (Fall)
Course examines survey research methodology, including the use of face-to-face, telephone and self-administered questionnaires. Topics include: methods of data collection; developing and ordering questions; formatting; determining reliability and validity; methods of sampling; implementation; maximizing response rate; data issues; and reporting.

PRMD 6621  Maternal and Child Health  1.0 cr.
Dr. C. DiGuiseppi – (Fall)
This course introduces students to several current issues in maternal and child health such as electronic fetal monitoring, well child care, accidents, adolescent pregnancy, child abuse, chronic illness and child advocacy.

PRMD 6622  Cancer Prevention and Control  2.0 cr.
Dr. T. Byers – (Summer)
Course provides overview of preventable cancers, epidemiology and contributing factors. Phases of cancer control research and appropriate methodologies are discussed. Basic principles of intervention development are reviewed. Psychosocial issues related to cancer are discussed. Students research topic related to course.

PRMD 6624  Community Diagnosis  3.0 cr.
J. Baxter – (Fall) Prereq: PRMD 6630.
Community diagnosis provides the means of assessing the social, economic, physical, and environmental status of a community, as these factors affect the health of its population. Students will learn to use national and local demographic and health data resources.

PRMD 6625  Methods in Health Services Research  3.0 cr.
Drs. A. Beck– (Spring) Prereq: BIOM 6601, BIOM 6680, PRMD 6603, PRMD 6617, PRMD 6626, PRMD 6630 Coreq: PRMD 6631.
This course provides an overview of research methods in health services. This class is designed for individuals who have completed the MSPH prerequisites and who have taken or are taking PRMD 6631.

PRMD 6626  Research Methods in Community Health  3.0 cr.
Dr. D. Lezotte – (Spring) Prereq: BIOS 6601, PRMD 6630
Research methods topics include: cohort and case control studies, clinical trials, medical care evaluation, and survey research. Lectures and discussions cover problem statement and hypothesis formulation, study design, data collection and analysis.

PRMD 6628  Seminar Series in Preventive Medicine  1.0 cr.
Dr. C. DiGuiseppi – (Fall, Spring)
Seminar series designed to present recent important findings in preventive medicine/biometrics. Different topics presented twice a month (except summer months) in departmental grand rounds and seminar presentations by Department of Preventive Medicine and Biometrics faculty and invited guest speakers.

PRMD 6629  Clinical Epidemiology: Studies in Diagnosis, Prognosis and Treatment  1.0 cr.
Dr. T. Byers – (Summer)
This course provides an overview of the design, conduct, and appraisal of clinical research. Topics include choice of study design, issues in randomized trials (bias, measurement, validity), assessment of diagnostic tests, functional status measurement, meta-analysis, and use of questionnaires.

PRMD 6630  Epidemiology  4.0 cr.
Dr. R. Hamman – (Fall)
Offers introduction to approaches/methods used in describing the natural history of disease in the community and for locating clues to the causes of disease, and analytical epidemiology used in study of disease etiology and critical review of the medical literature.

PRMD 6631  Analytical Epidemiology  3.0 cr.
Dr. J. Hokanson – (Fall) Prereq: PRMD 6630, BIOS 6601.
Course emphasizes analytical foundations of epidemiology and its application to etiologic studies and public health practice. Topics include determining rates of disease occurrence, assessing exposure disease relationships, stratified analysis, measurement error and sampling. Final project requires analysis/interpretation of epidemiologic data.
PRMD 6632  Advanced Epidemiologic Methods  2.0 cr.
Dr. J. Marshall - (Spring) Prereq: PRMD 6630, PRMD 6631, BIOS 6601
This is a course on epidemiologic methods designed to improve the student’s ability to conduct and interpret epidemiologic studies including intervention studies, cohort studies and case control studies.

PRMD 6635  Epidemiology of Communicable Disease  3.0 cr.
Dr. C. Nyquist - (Spring) Prereq: PRMD 6630.
This course considers the epidemiology of selected communicable diseases. Methods for their prevention and control, and assessment of these methods will be treated primarily through case studies.

PRMD 6636  Chronic Disease Epidemiology  3.0 cr.
Dr. D. Dabelea - (Spring) Prereq: PRMD 6630.
The major chronic diseases of Western countries will be reviewed including heart disease, cancer, stroke, diabetes, neurological diseases, and selected other conditions. Factual information about epidemiology of these diseases will be provided with the discussion of methodological issues which arise.

PRMD 6637  Injury Epidemiology and Control  2.0 cr.
Dr. C. DiGuiseppi - (Fall)
Major causes of injuries in U.S. will be reviewed. This includes motor vehicle traffic injuries, other unintentional injuries (including occupational injuries) and intentional injuries. The major components of injury control will be discussed – acute care, biomechanics, epidemiology and surveillance, prevention/rehabilitation.

PRMD 6638  Cardiovascular Epidemiology  1.0 cr.
Dr. J. Hokanson - (Fall) Prereq: PRMD 6630.
Course provides practical introduction to current concepts, research methods, unanswered questions in epidemiology of coronary artery disease, stroke/peripheral artery disease. It prepares students for independent work in academic/nonacademic settings in the area of cardiovascular disease surveillance, etiology and outcome research.

PRMD 6639  Genetic and Molecular Epidemiology  2.0 cr.
Dr. J. Norris – (Spring) Prereq: PRMD 6630, BIOS 6601
This course reviews basic genetic principles and teaches epidemiologic methods employed in the investigation of the genetic susceptibility to chronic disease. This course also covers the methods, uses, and limitations of modern molecular technologies applied to epidemiological problems.

PRMD 6641  Public Health and the Aging Population  2.0 cr.
Dr. L. Bryant – (Spring)
This course will introduce students to 1) factors across the social-ecological spectrum that will affect population patterns of health, disease, and risk factors in older adults; and 2) appropriate responses by public health, aging services and the research community.

PRMD 6643  The Nuclear West  2.0 cr.
Dr. J. Ruttenber – (Fall) Crosslisted: UCB - ENVS 5100/JOUR 5871 Course Restrictions: Permission of Instructor.
This interdisciplinary seminar examines historical nuclear issues in the West from perspectives of natural science, epidemiology and the news media. Topic for each session will be addressed from a matrix of issues, as described in the following course schedule.

PRMD 6645  Critical Reading Seminar  1.0 cr.
Dr. R. Hamman – (Spring) Prereq: PRMD 6630, PRMD 6626; BIOS 6601.
Through informal reading/discussion of current articles in medical literature, students will present journal summaries, lead small group discussion of an article, identify potential sources of bias in design and conduct of published research, and suggest alternate research designs/analyses.

PRMD 6646  Methods for Systematic Reviews  1.0 cr.
Dr. C. DiGuiseppi - (Spring) Prereq: PRMD 6630, or permission of instructor.
Introduces the rationale and methods for conducting systematic reviews to evaluate health and community interventions. Topics will include designing systematic reviews, study identification and selection, publication bias, assessing study quality, meta-analysis, exploring heterogeneity, and reporting results through the Cochrane Library.

PRMD 6651  Research Paper  1-4 crs.
Dr. P. Barton - (Fall, Spring, Summer) Prereq: PRMD 6626, PRMD 6630, BIOS 6601, BIOS 6680.
Independent research project is required of all students. It is anticipated that all projects will involve the analysis of quantitative data. Students have option of completing written report in the form of either a thesis or a publishable research paper.

PRMD 6670  Topics in Preventive Medicine  1-3 crs.
Dr. P. Barton - (Fall, Spring, Summer)
Special interest areas of current preventive medicine research and controversy are analyzed in depth. The course format is lecture and discussion or seminar.

PRMD 6840  Research in Preventive Medicine  1-3 crs.
Dr. P. Barton - (Fall, Spring, Summer) Prereq: PRMD 6626, PRMD 6630, BIOS 6601, BIOS 6680.

Resources of the department are available to those students who elect to carry out research in chosen topics. A faculty member will provide guidance throughout the project.

**PRMD 6910  Field Practicum**  
1-3 crs.  
Dr. P. Barton - (Fall, Spring, Summer) Prereq: PRMD 6626, PRMD 6630, BIOS 6601, BIOS 6680.  

Students may work in state and local health departments or industry. Students can participate in ongoing studies in chronic and infectious disease epidemiology, environmental health and community health planning, or develop their own project in conjunction with a preceptor.

**PRMD 6950  Master's Thesis**  
1-3 crs.  
Dr. P. Barton - (Fall, Spring, Summer) Prereq: PRMD 6626, PRMD 6630, BIOS 6601, BIOS 6680.  

An independent research project is required of all students as a final demonstration of acquired skills and knowledge. Students have the option of completing the written report in the form of either a thesis or a publishable research paper.

**PRMD 7600  Topics in Epidemiology and Biometrics**  
1-4 crs.  
Dr. D. Dabelea – (Fall, Spring, Summer) Consent of instructor is required.  

Special interest areas of current epidemiologic research and biomedicine are analyzed in depth.

**PRMD 7850  Independent Study in Bioethics, Medical Humanities or Health Law**  
1-6 crs.  
Dr. M.Yarborough - (Fall, Spring, Summer) Consent of instructor is required.  

Course is designed to meet the needs of students interested in conducting advanced studies of issues and topics in bioethics, medical humanities, or health law. Students will work under the direction of the course director on a specific research topic.

**PRMD 7911  Epidemiologic Field Methods**  
1-4 crs.  
Dr. D. Dabelea - (Fall, Spring, Summer). Prereq. PRMD 6626, PRMD 6630, PRMD 6631, PRMD 6632, BIOS 6611, BIOS 6612. Course Restrictions: Permission of instructor is required.  
Ph.D. students have the opportunity to work with faculty on current epidemiologic projects to develop skills in field research, proposal writing, budget development, staff hiring and training, protocol and instrument development and implementation, and specific methods topics.

**PRMD 7912  Developing a Research Grant**  
3 crs.  
Dr. D. Dabelea – (Fall) Prereq: PRMD 6611, PRMD 6612, PRMD 6626, PRMD 6630, PRMD 6631, PRMD 6632, BIOS 6611, BIOS 6612. Course Restrictions: Enrollment in Epidemiology PhD Program or Permission of the instructor  
Course instructs students how to prepare quality, successful, research grant applications. It offers students an opportunity to familiarize themselves with the grant writing and review process, enhance critical thinking skills, formulate hypothesis and interpret results, improve quality of scientific writing.

**PRMD 7915  Analytic Methods in Epidemiology**  
1-4 crs.  
Dr. D. Dabelea – (Fall, Spring, Summer) Prereq: PRMD 6626, PRMD 6630, PRMD 6631, PRMD 6632, BIOS 6611, BIOS 6612. Course Restrictions: Permission of instructor is required.  
Advanced treatment of techniques in the analysis of epidemiological studies, including longitudinal, time-dependent, survival data, causality, missing data, etc. Students will analyze data sets currently on file using contemporary epidemiological methods.

**PRMD 8990  Doctoral Thesis**  
Variable cr.  
Dr. D. Dabelea - (Fall, Spring, Summer) Prereq: Consent of the Instructor  
Doctoral thesis work Epidemiology

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**REPRODUCTIVE SCIENCES**

**RPSC 7650  Research in Reproductive Science**  
Variable cr.  
Dr. M.C. Neville - (Fall, Spring, Summer) Prereq: Consent of the Instructor  
Research work in Reproductive Science

**RPSC 7652  Special Topics in Reproductive Science**  
Variable cr.  
Dr. M.C. Neville - (Fall, Spring, Summer) Prereq: Enrollment in PhD Program in Graduate School  
This course provides instruction in a specialized area of Reproductive Science. Course content and the extent of the course varies from year to year.

**RPSC 7801  Molecular Mechanisms of Reproductive Endocrinology and Metabolism**  
3.0 cr.  
Dr. M.C. Neville - (Spring) Prereq: Core Courses IDPT 7800, IDPT 7801, IDPT 7802  
Restrictions: UCDAMC graduate students; others by permission of the Course Director  
Endocrine systems will be covered from the molecule to the systems level. Pituitary secretions actions/regulation, regulation of water, ion, calcium balance, regulation of metabolism including insulin secretion/action will be discussed, the context of normal physiology, the mechanisms of endocrine dysfunction.
### RPSC 7802 Reproductive Development
1.0 cr.
Dr. M.C. Neville - (Spring) Prereq: Core Courses IDPT 7800, IDPT 7801, IDPT 7802
Focus of course is developmental biology of reproductive systems. Sex determination, fertilization, implantation, development of placenta and mammary glands will be covered in lectures and discussions of current literature. Course is designed to follow Endocrinology and Metabolism in Spring semester.

### RPSC 8990 Doctoral Thesis
Variable cr.
Dr. M.C. Neville - (Fall, Spring, Summer) Prereq: Consent of the Instructor
Doctoral thesis work in Reproductive Science

### TOXICOLOGY

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>TXCL 7310</td>
<td>Fundamentals of Pharmaceutical Sciences</td>
<td>3.0 cr.</td>
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<tr>
<td>Dr. D. Petersen - (Fall) Crosslisted: PHSC 7310</td>
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<tr>
<td>TXCL 7322</td>
<td>Molecular and Target Organ Toxicology</td>
<td>3.0 cr.</td>
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<tr>
<td>Dr. D. Ross - (Fall) Prereq: Discussion with and consent of Instructor.</td>
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<tr>
<td>TXCL 7323</td>
<td>Environmental and Target Organ Toxicology</td>
<td>2.0 cr.</td>
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<tr>
<td>Dr. D. Petersen - (Spring) Prereq: Discussion with and consent of Instructor.</td>
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<tr>
<td>TXCL 7325</td>
<td>Current Topics in Toxicology Research</td>
<td>2.0 cr.</td>
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<td>Dr. C. Ju - (Fall, Spring)</td>
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<tr>
<td>TXCL 7326</td>
<td>Current Concepts &amp; Comprehensive Review of Physiology</td>
<td>4.0 cr.</td>
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<td>Dr. R. Radcliffe - (Spring)</td>
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<tr>
<td>TXCL 7330</td>
<td>Issues in Drug Development</td>
<td>2.0 cr.</td>
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<td>Dr. J. Carpenter - (Fall) Prereq: Consent of Instructor</td>
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<tr>
<td>TXCL 7400</td>
<td>Ethical Issues in Toxicology and Pharmaceutical Sciences</td>
<td>1.0 cr.</td>
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<tr>
<td>Dr. R. Agarwal - (Fall)</td>
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<tr>
<td>TXCL 7475</td>
<td>Advanced Topics in Toxicology</td>
<td>Variable cr.</td>
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<tr>
<td>Dr. V. Vasiliou - (Fall) Prereq: Consent of instructor/Program Director.</td>
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<tr>
<td>TXCL 7555</td>
<td>Evidenced-Based Toxicology</td>
<td>2.0 cr.</td>
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<td>P. Guzelian - (Fall, Spring)</td>
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Students perform literature research to address actual ongoing consultations made to a private practice of environmental toxicology. Questions of occupational/environmental safety, product safety, regulatory compliance, personal injury, medical monitoring are addressed by writing conclusions formed using principles of Evidence-Based Toxicology.
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<tr>
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<tbody>
<tr>
<td>TXCL 7561</td>
<td>Drug Metabolism &amp; Pharmacogenetics</td>
<td>2.0 cr.</td>
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<td>Dr. V. Vasiliou - (Spring) Crosslisted: PHCL 7561</td>
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<td></td>
<td>This course will focus on the reactions that the exogenous compounds undergo in mammalian systems and the mechanisms of these reactions. Enzyme kinetics and unusual (idiosyncratic) drug responses that have a hereditary basis will be discussed.</td>
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<tr>
<td>TXCL 7562</td>
<td>Analytical Basis of Forensic Toxicology</td>
<td>2.0 cr.</td>
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<td>Dr. V. Vasiliou - (Fall) Prereq: One year organic chemistry with lab</td>
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<td></td>
<td>Principles of analysis of abused drugs in biological samples within framework of legal requirements. Considerations include type of sample, routes/kinetics of metabolism, analytical methodology, possible interferences of physiological impairment. Agents include ethanol, cocaine, cannabinoids, amphetamines, opiates, phencyclidine, and anabolic steroids.</td>
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<tr>
<td>TXCL 7564</td>
<td>Environmental Risk Assessment and Applied Toxicology</td>
<td>2.0 cr.</td>
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<td>Dr. D. Pyatt - (Spring)</td>
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<td></td>
<td>Provides students with experience in risk assessment, environmental toxicology for public health and regulatory decision making. Topics include comprehensive human health risk assessments, baseline/probabilistic statistics, ecological risk assessment activities associated with emergency action, medical monitoring, role toxicology plays in courtroom.</td>
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<tr>
<td>TXCL 7575</td>
<td>Drug Development for the Toxicologist</td>
<td>2.0 cr.</td>
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<td>Dr. V. Vasiliou - (Spring) Prerequisites TXCL 7322</td>
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<td>Course will provide an understanding of regulatory obligations required for submitting an N.D.A. as well as discussions related to additional corporate roles including activities for in vivo study conduct &amp; due diligence review for licensing opportunities.</td>
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<tr>
<td>TXCL 7650</td>
<td>Research Rotation in Toxicology</td>
<td>Variable cr.</td>
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<td></td>
<td>Dr. V. Vasiliou - (Fall, Spring, Summer)</td>
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<td></td>
<td>Research work in toxicology.</td>
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<tr>
<td>TXCL 7655</td>
<td>Pharmacokinetics and Toxicokinetics</td>
<td>2.0 cr.</td>
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<td>Dr. V. Vasiliou - (Fall)</td>
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<td></td>
<td>This is a course on the pharmacokinetic analysis of xenobiotics. Absorption, distribution, metabolism and elimination of drugs will be discussed with focus on mathematical descriptions.</td>
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<tr>
<td>TXCL 7670</td>
<td>Methods in Molecular Toxicology</td>
<td>2.0 cr.</td>
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<td>Dr. C. Franklin - (Spring)</td>
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<td>This is a laboratory-based course that involves the carrying out of biochemical, molecular and analytical based experiments in the laboratories of toxicology faculty. Requirements for each laboratory assignment will be at the discretion of the instructor for that section.</td>
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<tr>
<td>TXCL 8990</td>
<td>Doctoral Thesis</td>
<td>Variable cr.</td>
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<td></td>
<td>Dr. V. Vasiliou - (Fall, Spring, Summer) Prereq: Consent of the instructor.</td>
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<td>Doctoral thesis work in toxicology.</td>
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</table>