

# PED 7060 Pediatric Medical Genetics Syllabus

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**Credit Hours: 2-4**

## Contact Information

Name	Position	Phone/Pager	Email
David Viskochil, MD, PhD	Course Director	(801) 581-2421	Dave.Viskochil@hsc.utah.edu
Justine Ju	Dept Contact	(801) 585-7563	Justine.Ju@hsc.utah.edu
Tiffany Passow	Course Coordinator	(801) 662-5705	Ped.Education@hsc.utah.edu

## Course Information

### Brief Description of Course

Medical Genetics involves any application of genetics to medical practice. It includes the studies of the inheritance of diseases in families, analyses of the molecular mechanisms through which genes cause disease, and the diagnosis and treatment of genetic disease. Medical genetics also includes genetic counseling, in which information regarding risks, prognoses, and treatments is communicated to patients, their families, and their primary care providers. As a result of seeing new and established patients in our Pediatric Medical Genetics Clinics, the medical student will develop an approach to establishing diagnoses in those families with a syndrome, both clinically and at the molecular level. The medical student will understand the basics of genetic counseling and provision of anticipatory guidance and management of common genetic conditions. The medical student will appreciate the collaboration required between the primary care provider and pediatric medical genetics subspecialist in providing optimal care to families with genetic disorders.

### Course Goals

**Learning Objectives** (see as many patients as possible in time available):

- Understand basic genetic principles
- Obtain pedigree information from consult and
- Interpret inheritance patterns from pedigree information
- Identify key components of a genetics evaluation
- Distinguish autosomal dominant, autosomal recessive, X-linked recessive, X-linked dominant, mitochondrial, and multifactorial inheritance patterns
- Determine distinction between inborn errors of metabolism and syndromal etiologies of developmental delay
- Demonstrate understanding of indications for genomic testing
- Demonstrate understanding of indications for biochemical testing
- Interpret test results and understand implication of informing interview
- Demonstrate proficiency in accessing the genome browser
- Demonstrate ability to utilize databases to identify Mendelian disorders from cytogenomic SNP microarray results with genomic imbalances and/or segments of homozygosity
- Recognize value of collaboration between primary care providers, medical geneticists, genetic counselors, nurse practitioners, and dieticians in providing care to families with genetic conditions
- Navigate ethical issues related to genetic issues

Learning guide to the 6 competencies for genetics trainees as outlined by the American Board of Medical Genetics and Genomics (ABMGG) [http://abmagg.org/pages/program\\_learning.shtml](http://abmagg.org/pages/program_learning.shtml)

## Course Format & Sample Schedule

### Outpatient Clinics (Station 5, Third Floor PC Eccles Outpatient Facility 662-7511):

- Mon – Biochemical Genetics (Shayota, Botto, Underhill, McMinimee, Andrews)  
Clinical Genetics (Flores)
- Tues – Clinical Genetics (Dent, Cole; Flores, Taliercio, Wilcox, Viskochil)
- Wed – Clinical Genetics (Flores, Cole, Wilcox, Viskochil)
- Thurs – Clinical Genetics (Flores, Cole, Shayota)
- Fri – Clinical Genetics (Taliercio)

#### **General Genetics Providers**

Audrey Rutz (Genetic Counselor), [audrey.rutz@hsc.utah.edu](mailto:audrey.rutz@hsc.utah.edu)  
Brian Shayota (MD), [brian.shayota@hsc.utah.edu](mailto:brian.shayota@hsc.utah.edu)  
David Viskochil (MD, PhD), [dave.viskochil@hsc.utah.edu](mailto:dave.viskochil@hsc.utah.edu)  
Janice Palumbos (Genetic Couns), [janice.palumbos@hsc.utah.edu](mailto:janice.palumbos@hsc.utah.edu)  
Josue Flores (MD), [josue.flores@hsc.utah.edu](mailto:josue.flores@hsc.utah.edu)  
Karin Dent (Genetic Counselor), [karin.dent@hsc.utah.edu](mailto:karin.dent@hsc.utah.edu)

#### **Metabolic/Biochemical Genetics Providers**

Ashley Andrews (NP), [Ashley.andrews@hsc.utah.edu](mailto:Ashley.andrews@hsc.utah.edu)  
Hunter Underhill (MD, PhD), [hunter.underhill@hsc.utah.edu](mailto:hunter.underhill@hsc.utah.edu)  
Lorenzo Botto (MD), [Lorenzo.botto@hsc.utah.edu](mailto:Lorenzo.botto@hsc.utah.edu)  
Katie Mcminimee (NP) [katie.mcminimee@hsc.utah.edu](mailto:katie.mcminimee@hsc.utah.edu)  
[Annabelle.wilcox@hsc.utah.edu](mailto:Annabelle.wilcox@hsc.utah.edu)  
[stacey.cole@hsc.utah.edu](mailto:stacey.cole@hsc.utah.edu)  
Vanina.taliercio@hsc.utah.edu

### Inpatient Rounds

- Fridays, 12 noon - 1
- On-call physician from previous week oversees patient presentations
- Review of patients followed by walk rounds to selected patients

### Biochemical Rounds

- Wednesday 1:00-2:00 zoom to review upcoming clinic following Monday
- Friday afternoon 15:00-16:00 zoom to review results from previous Monday Clinic

### Case Management Conference

- Wednesday at 2 to 3pm (zoom discussion of selected patients)
- Wednesday from 3-4pm formal presentation of various genetics topics (zoom)

### Other Clinical Genetics Experiences

- Prenatal Diagnosis Conference (Fridays 7:30-8:30 (zoom); 2B329)
- Prader-Willi Syndrome Clinic (2<sup>nd</sup> Thursday every other month)
- Hearing Loss Clinic (every other Friday)
- Tuberous Sclerosis Complex Clinic (4<sup>th</sup> Friday, every month)
- Skeletal Dysplasia Clinic (variable on Thursday)
- Osteogenesis Imperfecta Clinic (2<sup>nd</sup> Wednesday every 3 months at Shriners)
- Neurofibromatosis Clinic (2<sup>nd</sup> Friday every month at Lehi)
- Nephrogenetics Clinic
- Disorders of Sexual Development
- Genomic Resequencing Clinic
- Phenotype-driven analysis case review – ARUP zoom (every other Thursday)

### **Processes in the medical genetics clinic setting**

Orientation – On the first day of rotation go to the Eccles Outpatient Services building station 5 on the 3<sup>rd</sup> floor and touch base with one of the core faculty for the medical genetics training program (David Viskochil, Vanina Taliercio). Patients will be assigned at that time.

Clinic Encounters – Patients are assigned weekly from a master list based on trainee's schedule. Administrative personnel in the Medical Genetics office assemble the upcoming clinic encounter list and email to clinic personnel, including trainees. There is flexibility on how many patients will be evaluated and how clinic notes are generated. Each attending has individual preferences, and it is the trainee's responsibility to contract their respective role with each outpatient clinic encounter. This could include observer/shadower only, history acquisition, perform physical examination, counsel family, and/or compose clinic note. Inpatient consults require working closely with the weekly attending to determine level of independence and expectations for provision of genetics services.

Overall expectations – Genetics encounters are team consultations, which means integrating your contribution with genetic counselors, nurse practitioners, dietitians, laboratory fellows, medical genetics fellows, and genetics medical assistants. Contracting with members of the team prior to individual encounters is essential to determine the role each member will play in the consultation.

Unique genetics experiences – Pedigree acquisition and integration of family history into a genetics consultation is a paramount expectation in this rotation. Trainees will be expected to be able to *procure a 3-generation pedigree* by the end of the rotation. Understanding the *clinical presentation* of known conditions is another key aspect of this rotation, which means spending time with family member on how the diagnosis was initially established for return patients. The generation of a *differential diagnosis* for new patient encounters is an art in medicine, especially so in genetics encounters as families begin their potential diagnostic odyssey. Once a genetic diagnosis is established, *intervention* with treatment protocols for known metabolic disorders and/or accession to clinical trials for rare syndromes are key components in the practice of medical genetics. Finally, sensitivity to the delivery of informing news with respect to a diagnosis possibly affecting additional family members (*genetic counseling*) is an essential competency in medical genetics that should be recognized during this rotation.

**The competencies are adjusted to each trainee: Observer without medical training, shadower, medical student, pediatric resident, genetic counselor trainee, non-medical genetics fellow, and ABMGG genetics laboratory trainee.**

**Activities: Pre-test at start of rotation; Attend clinics, consults, genetics conferences.  
Post-test at end of rotation**

**Evaluation: e-value assessments based on attendance, consults, team participation**

#### **Counseling issues in Genetics**

- Pedigree analysis**
- Preconception testing**
- Newborn screening**
- Informing interview**
- At risk family members**
- Incidental findings**
- Non-paternity**
- Consanguinity**

**Key Genetic Conditions:**

**Biochemical Genetics**

- Urine organic acidopathies
  - Glutaric Acidemia type I
  - Methylmalonic Acidemia
  - Propionic Acidemia
- Serum amino acidopathies
  - Hyperglycinemia
  - Phenylketonuria (PKU)
  - Urea cycle defects
- Fatty Acid Oxidation Defects
  - MCAD
  - VLCHAD
- Galactosemia

**Hyperammonemia**

- Lactic acidosis
- Mitochondrial disorders

**Clinical Genetics**

- Chromosome anomalies
  - Down syndrome (trisomy 21)
  - Edwards syndrome (trisomy 18)
  - Patau syndrome (trisomy 13)
  - Turner syndrome (45,X)
  - Klinefelter syndrome (47,XXY)
- Microdeletion syndromes
  - Deletion 22q11.2
  - Williams syndrome
  - Smith-Magenis syndrome
- Imprinting disorders
  - Prader-Willi syndrome
  - Angelman syndrome
  - Beckwith-Wiedemann syndrome
- Trinucleotide expansion disorders
  - Fragile X syndrome
  - Huntington disease
  - Myotonic dystrophy
- Skeletal dysplasias
  - Achondroplasia
  - Thanatophoric dysplasia
  - Osteogenesis imperfecta
- Neurocutaneous disorders
  - Neurofibromatosis type 1
  - Tuberous sclerosis
  - Von-Hippel Lindau syndrome
- Lysosomal storage disorders
  - Mucopolysaccharidoses
  - Pompe syndrome
  - Gaucher disease
  - Fabry disease
- Peroxisomal disorders
  - X-Linked adrenoleukodystrophy

**Zellweger syndrome**

- Alexander disease
- Mosaicism
- Epigenetics
- Multifactorial disorders

**Handouts:** (<https://uofu.box.com/s/gtu0mv39h0fkleu8oc8gcsu1nmontpmj>)

**Pedigree Nomenclature**

PEDIATRICS Volume 132, Supplement 3, December 2013  
Principles of Anticipatory Guidance (<https://pubmed.ncbi.nlm.nih.gov/1531255/>)  
Competencies in Medical Genetics

**PowerPoint lectures:**

- Clinical Genetics (HGEN 6470)**
- Clinical Biochemical Genetics (HGEN 7380)**
- Human Genetics (HGEN 6500)**

**Educational and Instructional Modalities**

As an example:

Modality	Percentage
Didactic	10%
Clinic Time	80%
Free Study	10%

**Role of the Student in this Course**

If you are sick or cannot come to clinic, please contact the Genetics Dept Contact listed on the first page of this syllabus to let the attending know.

**Required Textbook(s)/Readings**

Some required readings in the form of Journal Articles will be provided during the course of the rotation and will be accessible through Canvas. Textbooks below are available in offices of our faculty.

- \*Medical Genetics: Jorde, Carey, Bamshad: 6<sup>th</sup> edition**
- \*Management of Genetic Syndromes: 4th edition**
- Smith's Recognizable Patterns of Human Syndromes: 6<sup>th</sup> edition**
- Inborn Errors of Metabolism**
- Inborn Errors of Development**
- Syndromes of the Head and Neck**

**Key Websites**

- OMIM (Online Mendelian Inheritance of Man): [www.omim.org](http://www.omim.org)**
- GeneReviews ([www.ncbi.nlm.nih.gov/books/NBK1116/](http://www.ncbi.nlm.nih.gov/books/NBK1116/))**
- Genome browser ([www.genome.ucsc.edu/](http://www.genome.ucsc.edu/))**
- ClinVar (<https://www.ncbi.nlm.nih.gov/clinvar/>)**

**Assessment & Grading**

**Preceptor Evaluations**

For Clinical Courses: This Clinical Course employs a preceptor evaluation which contributes to the student's overall course grade. Competencies are adjusted to level of training of the medical student.

Activities: Pre-test at start of rotation; Attend clinics, consults, genetics conferences; Post-test at end of rotation

Evaluation: e-value assessments based on attendance, consults, team participation

**Assessments**

Assessment Name	Weight toward Final Grade
Preceptor Evaluations	100%

**Grading System**

Students will receive a final letter grade of PASS (P) or FAIL (F) for this course.

Only elective courses with approved alternative grading schemes may use H/HP/P/F or H/P/F grading

**PASS:** A student who achieves the criteria, will be assigned a grade of PASS for the course.

**FAIL:** A student who fails to achieve the criteria for PASS, will be assigned a grade of FAIL for the course.

## Student Feedback

Providing feedback is an important aspect of our professionalism expectations and helps with curriculum quality improvement. For each clinical course in Phases 3-4 you must complete an end-of-course survey and individual surveys of clinical faculty and residents by the due date to demonstrate reliability for the professionalism competency. Required surveys are administered online through Qualtrics and student responses are anonymous. Please refer to the resource section of the course canvas page for student feedback survey due dates.

## Standard Practices

Please refer to the Clinical Curriculum Procedures and Practices for the following:

- Phase 4 Developmental Benchmarks for Priority EPAs**
- Phase 4 Formative Feedback Form**
- Phase 4 Global Rating Form (Preceptor Evaluation)**
- Phase 4 Attendance Expectations**
- Medical Student Clinical and Educational Work (formerly Duty Hours)**
- Medical Student Clinical Documentation**
- Medical Student Call Rooms**
- Medical Student Mobile Communication**
- Students as Interpreters**

## Standard Policies

Please refer to the Student Handbook (on the Student Affairs website) for these policies:

- Accommodations**
- Addressing Sexual Misconduct**
- Dress Code**
- Examination and Grading Policies**
- Grade or Score Appeal**
- Professionalism, Roles & Responsibilities**
- Mistreatment**
- Infectious, Environmental and Bloodborne Pathogen Exposures Policy**

## Alternate Name and/or Personal Pronoun

Class rosters are provided to the instructor with the student's legal name as well as 'Preferred' first name (if previously entered by you in the Student Profile section of your CIS account). While CIS refers to this as merely a preference, we will honor you by referring to you with the name and pronoun that feels best for you in class, on papers, exams, group projects, etc. Please advise us of any name or pronoun changes (and please update CIS) so we can help create a learning environment in which you, your name, and your pronoun will be respected.

## Center for Disability & Access Services

The School of Medicine seeks to provide equal access to its programs, services and activities for all medical students. The Center for Disability and Access (CDA) provides accommodations and support for the educational development of medical students with disabilities. Medical students with a documented disability, and students seeking to establish the existence of a disability, that would like to request accommodations are required to meet with the CDA to establish accommodations. The CDA will work closely with eligible students and the Academic Success Program to make arrangements for approved accommodations. The School of Medicine and CDA maintain a collegial, cooperative, and collaborative relationship to ensure compliance with federal and state regulations for students with disabilities.

Steven Baumann EdD, School of Medicine Senior Director of Academic Success Program, serves as the liaison between the School Of Medicine and the CDA.

Contact Information:  
Dr. Steven Baumann, Senior Director of Academic Success Program

## Safety Statement

The University of Utah values the safety of all campus community members. To report suspicious activity or to request a courtesy



escort, call campus police at 801-585-COPS (801-585-2677). You will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit [safeu.utah.edu](https://safeu.utah.edu).