BIOST/STAT 551. Statistical Genetics II: Quantitative Genetics

Autumn 2019. Tuesday, Thursday 10:00-11:20, HSI I142

Instructor  Bruce Weir, bsweir@uw.edu. Offices: H655D, generally Tuesdays and Thursdays; 15th floor UW Tower, generally Mondays, Wednesdays, Fridays.

Catalog Syllabus  Statistical basis for describing variation in quantitative traits. Decomposition of trait variation into components representing genes, environment and gene-environment interaction. Methods of mapping and characterizing quantitative trait loci.

Wikipedia  Quantitative genetics is the study of continuous traits (such as height or weight) and their underlying mechanisms. It is effectively an extension of simple Mendelian inheritance in that the combined effects of one or more genes and the environments in which they are expressed give rise to continuous distributions of phenotypic values. [This is OK, the rest of the article is not.]

Logistics

Course Assessment

•  In-class presentations of questions of selected papers, worth 60% of grade for course. Work and present in groups.

•  Quantitative genetic data analyses of 1000 Genomes data, worth 40% of grade for course. Work in groups, submit individual reports.

Suggested Background Reading

Falconer and Mackay, “Introduction to Quantitative Genetics, 4th Edition”

Useful Reference Texts

Lynch and Walsh, “Genetics and Analysis of Quantitative Traits” 1998; Walsh and Lynch, “Evolution and Selection of Quantitative Traits” 2018

Class website

https://canvas.uw.edu/courses/1219174

Major Topics

•  Hardy-Weinberg Testing

•  Linkage and Linkage Disequilibrium

•  Population Structure and Relatedness

•  Quantitative Genetics

•  Heritability and Inbreeding Depression

•  Association Mapping

All these topics will be addressed with 1000 Genomes data.
Major Goals

Obtain a good understanding of


Obtain experience with these software packages:

- PLINK: zzz.bwh.harvard.edu/plink
- HardyWeinberg: https://cran.r-project.org/web/packages/HardyWeinberg/index.html
- Gaston: https://cran.r-project.org/web/packages/gaston/index.html
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<td>Oct 1</td>
<td>Hardy-Weinberg</td>
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<td>Part 2</td>
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<td>Presentations</td>
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<td>Oct 8</td>
<td>Linkage and Linkage Disequilibrium</td>
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<td>Oct 15</td>
<td>No class. Pair discussions</td>
<td>Oct 17</td>
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<td>Oct 29</td>
<td>Popuation Structure &amp; Relatedness</td>
<td>Oct 31</td>
<td>Quantitative Traits</td>
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<td>Nov 5</td>
<td>Quantitative Traits</td>
<td>Nov 7</td>
<td>Heritability &amp; Inbreeding Depression</td>
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<td>Nov 12</td>
<td>Heritability &amp; Inbreeding Depression</td>
<td>Nov 14</td>
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<td>Nov 19</td>
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<td>Nov 21</td>
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<td>Nov 26</td>
<td>Association Mapping</td>
<td>Nov 28</td>
<td>Thanksgiving Break</td>
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<td>Dec 3</td>
<td>No class. Pair discussions</td>
<td>Dec 5</td>
<td>Final Data Analysis Presentations</td>
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Land Acknowledgment

The University of Washington acknowledges the Coast Salish people of this land, the land which touches the shared waters of all tribes and bands within the Duwamish, Suquamish, Tulalip and Muckleshoot nations.

Diversity Statement

Diverse backgrounds, embodiments and experiences are essential to the critical thinking endeavor at the heart of University education. In SPH, students are expected:

1. To respect individual differences, which may include, but are not limited to, age, cultural background, disability, ethnicity, family status, gender, immigration status, national origin, race, religion, sex, sexual orientation, socioeconomic status and veteran status.

2. To engage respectfully in the discussion of diverse worldviews and ideologies embedded in course readings, presentations and artifacts, including those course materials that are at odds with personal beliefs and values.

3. To encourage students with concerns about classroom climate to talk to their instructor, adviser, a member of the departmental or SPH EDI Committee, the Assistant Dean for EDI, or the program’s director.

Access and Accommodations

Your experience in this class is important to me. If you have already established accommodations with Disability Resources for Students (DRS), please communicate your approved accommodations to me at your earliest convenience so we can discuss your needs in this course.

If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but are not limited to mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DRS at 206-543-8924 or uwdrs@uw.edu or disability.uw.edu. DRS offers resources and coordinates reasonable accommodations for students with disabilities and/or temporary health conditions. Reasonable accommodations are established through an interactive process between you, your instructor(s) and DRS. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law.

Religious Accommodations

Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW’s policy, including more information about how to request an accommodation, is available at Religious Accommodations Policy (https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/). Accommodations must be requested within the first two weeks of this course using the Religious Accommodations Request form (https://registrar.washington.edu/students/religious-accommodations-request/).
Bias Concerns

The Office of the Dean has a student concern policy, a faculty concern policy and standard HR procedures for staff concerns. Our 2018 climate survey states that most people in SPH do not report bias incidents because they do not know where to go. Students are encouraged to report any incidents of bias to someone they feel comfortable with, including instructors, advisers or department staff.

They can email dcinfo@uw.edu for immediate follow up. Bias concerns can be anonymously and confidentially reported at this link https://sph.washington.edu/about/diversity/bias-concerns. Data is collected by the Assistant Dean for EDI and the Director of Program Operations for Student and Academic Services and tracked for resolution and areas are identified for further training.