SCN330 GENETICS
A Course Outline for Science Education

Parsippany-Troy Hills School District

Approved by the Board of Education

Developed:
Revised:
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STATEMENT OF PURPOSE

Genetics is a one-semester course designed as a junior/senior elective. The major areas of study are: DNA structure, genetic recombination and cell division; gene expression and regulation; inheritance and epigenetics; and genetic technologies. Throughout the course, students explore a variety of real-world issues related to the genome and its role in both human and ecological health. Students will evaluate these issues from scientific, legislative, and ethical perspectives utilizing evaluative skills and evidence based argument.

The program is designed as a student-centered, laboratory course. As such, students will perform a variety of laboratory investigations, developing analytical skills, as well as practical skills. Genetics is structured to inspire excitement and enthusiasm for scientific thought in synchrony with developing students who are well informed in a topic that will be an integral part of every citizen’s life.

This course is aligned with the NEW JERSEY STUDENT LEARNING Standards for Literacy in Science and Technical Subjects, and the NEW JERSEY STUDENT LEARNING Standards for Technology (NJSLS for Technology), and the NEW JERSEY STUDENT LEARNING STANDARDS FOR SCIENCE (NJSLS). Separately we assess students to gauge progress and inform instruction. Benchmark assessments for students in grades 9 through 12 are administered in the form of a midterm and final exam for full year courses. *Special Note: Only final exams are administered at the end of quarter courses and semester courses.
THE LIVING CURRICULUM

Curriculum guides are designed to be working documents. Teachers are encouraged to make notes in the margins. Written comments can serve as the basis for future revisions. In addition, the teachers and administrators are invited to discuss elements of the guides as implemented in the classroom and to work collaboratively to develop recommendations for curriculum reforms as needed.

AFFIRMATIVE ACTION

During the development of this course of study, particular attention was paid to material, which might discriminate on the basis of sex, race, religion, national origin, or creed. Every effort has been made to uphold both the letter and spirit of affirmative action mandates as applied to the content, the texts and the instruction inherent in this course.

MODIFICATIONS AND ADAPTATIONS

For guidelines on how to modify and adapt curricula to best meet the needs of all students, instructional staff should refer to the Curriculum Modifications and Adaptations included as an Appendix in this curriculum. Instructional staff of students with Individualized Education Plans (IEPs) must adhere to the recommended modifications outlined in each individual plan.
GENERAL GOALS

The students will:

1. develop an understanding of the genome as an interactive blueprint for life.
2. explore current research and understanding of mutation and genetic interactions.
3. explore the role of the environment in gene expression and population genetics.
4. communicate effectively utilizing scientific evidence to support ideas.
5. develop laboratory and analytical skills.
6. explore the integration of science, health, politics, and ethics.
GRADING PROCEDURES

MARKING PERIOD GRADES

Long and Short Term Assessments, which may include: 90%
- Tests and Quizzes
- Technology Applications
- Laboratory Investigations
- Projects, Reports, Presentations
- Analysis of Assigned Readings

Daily Assessments, which may include: 10%
- Active Engagement in Class Activities
- Demonstration of Knowledge and Understanding of Course Material
- Skills and safety practices during laboratory investigations
- Do Now/Exit Questions
- Homework

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<th>FINAL GRADE – Semester Course</th>
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<td>• Each marking period shall count as 40% of the final grade – no midterm assessment will be administered.</td>
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<td>The final assessment, which will take place at the end of marking period 2 for semester one courses, and at the end of marking period 4 for semester two courses, will count as 20% of the final grade.</td>
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In accordance with district policy as mandated by the New Jersey Administrative Code and the NEW JERSEY STUDENT LEARNING Standards, the following are proficiencies required for the successful completion of the above named course.

The student will:

I. **DNA STRUCTURE, MEIOSIS, AND GENETIC RECOMBINATION**
   1. describe the structure and function of the DNA molecule.
   2. explain how DNA’s structure allows for replication.
   3. identify coding and non-coding regions of the genome.
   4. examine the process of meiotic cell division in order to explain the recombination of traits.
   5. identify errors in meiotic division and their implications for fetal tissue.
   6. explain the role of current prenatal testing techniques, their limitations, and uses.

II. **GENE EXPRESSION AND REGULATION**
   7. explain the flow of information from DNA to proteins.
   8. examine hormonal gene regulation.
   9. explore operon function and investigate its usefulness in genetic control.
   10. explore gene to gene interactions and research and communicate a relevant multigenic trait to understand its function.

III. **INHERITANCE AND EPIGENETICS**
   11. analyze Mendelian inheritance patterns and explain the insufficiency of Mendelian hypotheses to explain genetic inheritance.
   12. examine modern understanding of modes of inheritance, including autosomal, X-linked, multifactorial, and mitochondrial inheritance.
   13. utilize statistical evaluation tools, such as the Chi-Square test, to generate genetic explanations.
   14. identify environmental factors that may influence gene expression and inheritance.
   15. research and present findings on the impact of environment on a given trait and predict the consequences of changes in environmental factors.
IV. GENETIC TECHNOLOGIES

16. utilize BLAST and other current genomic databases to find genes associated with specific traits in multiple species.
17. explain the process of creating transgenic organisms.
18. examine and discuss the role of genetically modified organisms in society.
19. explore the role of viruses in genetic recombination and gene therapy.
20. explore the role of genetic variation in evolutionary processes.
### I. DNA STRUCTURE, MEIOSIS, AND GENETIC RECOMBINATION

**Essential Question(s):** How does the structure of the DNA molecule lend itself to replication, recombination, and diversity for life?

**Enduring Understanding(s):** DNA’s double helix structure allows for template replication, while the universal code of nucleotides allows for both continuity and diversity of life.

#### DNA STRUCTURE, MEIOSIS, AND GENETIC RECOMBINATION

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| 1. describe the structure and function of the DNA molecule. | HS-LS 1-1, HS-LS 3-1, RST.11-12.2,3,4, CRP2,7,11,12 | • complete the “Who’s the Daddy?” PBL in order to explore/review the structure of the DNA molecule. In completing the task, build a 3-D model of the DNA molecule; digitally manipulate the structure of the DNA molecule, investigating bonding and geometry.  
• extract DNA from their cheek cells.  
• learn about the technical aspects of DNA analysis by reading a research article through the use of a literacy strategy. | Students will be evaluated formatively throughout the task  
Upon completion of the task, a presentation or portfolio will be turned in | Full documentation for the PBL can be found at: [http://sciencesupport.net/genpbl/whosdaddywhole.pdf](http://sciencesupport.net/genpbl/whosdaddywhole.pdf)  
If students have already extracted their own cheek cell in a previous class (or human DNA is not desirable), bacterial DNA can be extracted instead: [http://www.apsnet.org/edcenter/K-12/TeachersGuide/DNA_Easy/Pages/MaterialsandMethods.aspx](http://www.apsnet.org/edcenter/K-12/TeachersGuide/DNA_Easy/Pages/MaterialsandMethods.aspx) |
# DNA STRUCTURE, MEIOSIS, AND GENETIC RECOMBINATION

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<td>• complete a real or simulated gel electrophoresis.</td>
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<td>2. explain how DNA’s structure allows for replication.</td>
<td>RST.11-12,4,9 CRP2,4,7,8,11,12 HS-LS1.A HS-LS1-1</td>
<td>• explore the sequencing and replication of DNA. • In teams, investigate a fictional Anthrax case by modeling DNA sequencing and tracking down the &quot;guilty&quot; lab.</td>
<td>Students will formally communicate their findings and conclusions</td>
<td>Full documentation and supporting materials can be found at: <a href="http://www.pbs.org/wgbh/nova/education/activities/0401_02_nsn.html">http://www.pbs.org/wgbh/nova/education/activities/0401_02_nsn.html</a></td>
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<td>3. identify coding and non-coding regions of the genome.</td>
<td>CRP4,5,7,11,12 RST.11-12,4,7,9 HS-LS1.A</td>
<td>• read a peer-reviewed paper about RNA processing (see suggested article in Teacher Notes) for class discussion. After discussion, form a small group and research diseases related to splicing and RNA processing, and prepare presentations to share with the class.</td>
<td>Presentations should be graded for depth, accuracy, and professionalism Sample topics include (ALS and various diseases of aging)</td>
<td>Suggested article: Phillips, A.V. &amp; Cooper, T.A. (2000) RNA Processing and Human Disease. <em>Cellular and Molecular Life Science</em>. 57(2) 235-249.</td>
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| 4. Examine the process of meiotic cell division in order to explain the recombination of traits. | RST.11-12.3 CRP2,6 HS-LS1-2,4 HS-LS3-1 HS-LS3.A,B | • explore meiotic division by:  
  o preparing an anther squash from a pollenating plant to observe cells at varying stages of meiosis.  
  o using a fictitious animal (the Reebop) to model recombination and phenotypic variation in offspring. | | Anther squash protocol: [http://www.nuffieldfoundation.org/print/2759](http://www.nuffieldfoundation.org/print/2759)  
Reebop resource: [http://www.nuffieldfoundation.org/print/3197](http://www.nuffieldfoundation.org/print/3197) |
<p>| 5. Identify errors in meiotic division and their implications for fetal tissue. | LS1.B LA3.A,B HS-LS3-1 HS-LS3-2 HS-LS3-3 CRP2,7,11 SL.11-12.1-4 8.1.12.E.1 | • research a variety of chromosomal abnormalities and resulting syndromes to determine risk factors for and contributors to the abnormalities, and characteristics of the syndrome. Use the Internet, especially resources from the National Center on Biotechnology Information, to do research and create a presentation or pamphlet. | Presentations should be assessed for format, readability, accuracy, and depth | Resources from CDC: <a href="http://www.cdc.gov/excite/ScienceAmbassador/ambassador_pgm/lessonplans_genetics.htm">http://www.cdc.gov/excite/ScienceAmbassador/ambassador_pgm/lessonplans_genetics.htm</a> |</p>
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<td>6. explain the role of current prenatal testing techniques, their limitations, and uses.</td>
<td>LS1.B CRP2,4,5,7,8,11 8.1.12.E.1</td>
<td>• explore current, commonly performed prenatal tests. Then, address the ethical implications of using our growing knowledge about the human genome to improve our personal and public health. For example, evaluate a situation in which genetic tests have revealed that a pregnancy may lead to the birth of a child with some genetic disorder(s), such as cystic fibrosis.</td>
<td>Individual student responses may be collected for assessment. Alternately, students may use their findings to prepare for a class debate.</td>
<td>Lesson resources: <a href="http://sciencenetlinks.com/lessons/ethics-and-reproductive-issues/">http://sciencenetlinks.com/lessons/ethics-and-reproductive-issues/</a></td>
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II. GENE EXPRESSION AND REGULATION

**Essential Question(s):** How does information flow from DNA to phenotypes?

**Enduring Understanding(s):** Coding regions of DNA provide instructions for building various proteins. Some of those proteins are directly responsible for phenotype, while others are responsible for regulating other genes.

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| 7. explain the flow of information from DNA to proteins. | LS3.A LS3.B HS-LS3-1 HS-LS3-2 CRP6,12 | • after discussion, work in small groups to build 3-D models of gene expression that can demonstrate transcription and translation.  
• use the models to explore/review the impact of mutation on an assembled protein. | Models should be assessed for completeness, accuracy, and usability | |
| 8. examine hormonal gene regulation. | LS3.B CRP2,4,7,11 8.1.12.A.2 8.1.12.E.1 | • select an endocrine system (thyroid, adrenal, reproductive, etc.) to research. Research how their system regulates gene expression; generate a feedback diagram, and share findings. | Findings/diagrams may be graded using a rubric | |
## GENE EXPRESSION AND REGULATION

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<td>9. explore operon function and investigate its usefulness in genetic control.</td>
<td>LS1.B LS3 CRP2 RST.11-12.3</td>
<td>• explore operon function, via the <em>lac</em> operon. If supplies permit, conduct laboratory investigation to detect gene activity in the presence of lactose (see procedure in Teacher Notes).</td>
<td>Laboratory work may be graded using a rubric</td>
<td>B-glucosidase activity in E.coli lab: <a href="http://www.nuffieldfoundation.org/print/1645">http://www.nuffieldfoundation.org/print/1645</a> A virtual version can be found here: <a href="https://phet.colorado.edu/en/simulation/gene-machine-lac-operon">https://phet.colorado.edu/en/simulation/gene-machine-lac-operon</a></td>
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<td>10. explore epistasis and communicate its relevance to human health.</td>
<td>HS-LS1 HS-LS3 HS-LS4 SL.11-12.1</td>
<td>• complete Gummi Bear® epistasis activity to compare expected to observed phenotypic rates.</td>
<td>Activity results, statistical analysis, and conclusions can be graded</td>
<td>Activity guide .PDF can be found at: <a href="https://www.google.com/url?sa=t&amp;rct=j&amp;q=&amp;esrc=s&amp;source=web&amp;cd=4&amp;ved=0CDAQFjADahUKEwi3-8vZpLPHAhWI0YAKHUIDCRw&amp;url=http%3A%2F%2Fwww.ableweb.org%2Fvolumes%2Fvol-30%2Fv30reprint.php%3Fch%3D33&amp;ei=z3zTVffXFYiijgwTJhqXgAQ&amp;usg=AFQjCNGFAm0OYGk6JJ45aLnDUhmYpVcJQ&amp;bvm=bv.99804247,d.eXY">https://www.google.com/url?sa=t&amp;rct=j&amp;q=&amp;esrc=s&amp;source=web&amp;cd=4&amp;ved=0CDAQFjADahUKEwi3-8vZpLPHAhWI0YAKHUIDCRw&amp;url=http%3A%2F%2Fwww.ableweb.org%2Fvolumes%2Fvol-30%2Fv30reprint.php%3Fch%3D33&amp;ei=z3zTVffXFYiijgwTJhqXgAQ&amp;usg=AFQjCNGFAm0OYGk6JJ45aLnDUhmYpVcJQ&amp;bvm=bv.99804247,d.eXY</a></td>
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III. INHERITANCE AND EPIGENETICS

**Essential Question(s):**

a) How is genetic information passed from one generation to the next?

b) How does the environment impact gene flow?

**Enduring Understanding(s):**

a) Combinations of parental genetic sequences are seen in offspring and can be predicted using probability. Often, however, the phenotypes are part of a continuum and the result of gene-gene interactions and other forms of regulation.

b) The environment can impact regulation of genes and also the probability that a gene is passed from parents to offspring.

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**INHERITANCE AND EPIGENETICS**

**PROFICIENCY / OBJECTIVE**

**SUGGESTED ACTIVITY**

**EVALUATION/ASSESSMENT**

**TEACHER NOTES**

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<th>The student will be able to:</th>
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<tr>
<td>11. Analyze Mendelian inheritance patterns and explain the insufficiency of Mendelian hypotheses to explain genetic inheritance.</td>
<td>• work on the virtual DNALC Mendelian inheritance lab, exploring heredity and genetic variation in corn and conducting statistical analyses.</td>
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<td><strong>Standards</strong></td>
<td><strong>Virtual lab:</strong></td>
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<td>HS-LS3 SL.11-12.1 RST.11-12.3 8.1.12.E.1</td>
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<td>INHERITANCE AND EPGENETICS</td>
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<td>The student will be able to:</td>
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<td>12. Examine modern understanding of modes of inheritance, including autosomal, X-linked, multifactorial, and mitochondrial inheritance.</td>
<td>HS-LS3 RST.11-12.3</td>
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<td>13. Utilize statistical evaluation tools, such as the Chi-Square test, to generate genetic explanations.</td>
<td>HS-LS3 HS-LS4</td>
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## INHERITANCE AND EPIGENETICS

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| 14. identify environmental factors that may influence gene expression and inheritance. | **HS-LS3**-2, **CRP2,3,5**, **RST.11-12.3** | **•** watch NOVA’s *Ghost in Your Genes* and complete companion activity. During the laboratory portion of the activity, complete a simulated microarray analysis.  
**•** or may, also complete the “Genes, Environment and Genetic Complexity: Aggression in Humans” activity, if time allows. | Laboratory work can be accessed via written conclusions | *Ghost in Your Genes* Teacher Guide: [http://www-tc.pbs.org/wgbh/nova/education/activities/pdf/3413_genes.pdf](http://www-tc.pbs.org/wgbh/nova/education/activities/pdf/3413_genes.pdf)  
| 15. research and present findings on the impact of environment on a given trait and predict the consequences of changes in environmental factors. | **HS-LS3**-2, **CRP2,4,5,8,11,12**, **RST.11-12.7,9** | **•** work in small groups to read and summarize an assigned article. Each group will share their summaries with the class, explaining how the environment affected the genome or gene pool in their article. After discussion, choose an environmental factor to further research. Groups will conduct their own research and present their findings. | Presentations may be assessed using a rubric | ‘Toxic river means rapid evolution for one fish species’ - [http://evolution.berkeley.edu/evolibrary/news/110301_pcbresistantcod](http://evolution.berkeley.edu/evolibrary/news/110301_pcbresistantcod)  
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<td>‘Answers begin to emerge on how thalidomide caused defects’ <a href="http://www.nytimes.com/2010/03/16/science/16limb.html?_r=0">http://www.nytimes.com/2010/03/16/science/16limb.html?_r=0</a></td>
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IV. GENETIC TECHNOLOGIES

**Essential Question(s):**

a) What are current tools that geneticists use to study genes?
b) How do we manipulate genes for the benefit of society?

**Enduring Understanding(s):**

a) There are a variety of ever evolving tools used to study genes, their regulation, and their interactions. One very useful tool is the BLAST search, a database maintained by the NIH. Here, scientists and interested individuals may search for any gene found to be associated with a phenotype of interest (in multiple species).
b) One very controversial genetic technology is genetic engineering. It is prevalent in the food industry, but may also be used for other things, such as bioremediation. Viruses may also be of use in many fields, particularly treatment of cancers.

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| 16. utilize BLAST and other current genomic databases to find genes associated with specific traits in multiple species. | HS-L53  
HS-L54  
8.1.12.A.5  
8.1.12.A.5 | • use a BLAST query to locate mutations in common genes that lead to diseases, such as cystic fibrosis. | Students should prepare a brief report on the disease that they researched, including the mutation location, protein abnormalities, and disease pathology | Lesson supplemental information: http://biophysics.illinois.edu/K12Outreach/Sample_Lessons_files/Name%20That%20Gene%20Lesson%20Plan.pdf |
| 17. explain the process of creating transgenic organisms. | 5.3.12.A.1  
5.3.12.A.3 | • conduct a transformation lab in bacterium, inserting a pGlo gene into bacteria. Transformed bacteria, in the presence of regulatory molecule, will then glow. | Students will write a formal lab report to share their findings | Virtual bacterial transformation: http://labcenter.dnalc.org/labs/transformation/transformation_h.html |
## GENETIC TECHNOLOGIES

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<td>• or may, also complete the HHMI virtual transgenic fly lab to explore the process in multicellular organisms.</td>
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<td>Transgenic Fly Lab: <a href="http://www.hhmi.org/biointeractive/transgenic-fly-virtual-lab">http://www.hhmi.org/biointeractive/transgenic-fly-virtual-lab</a></td>
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<td>18. examine and discuss the role of genetically modified organisms in society.</td>
<td>HS-LS3, HS-LS4, CRP5, 8.1.12.A.2</td>
<td>• select a type of GMO to research (produce, environmental remediation, etc.) Then, in small groups, conduct research and publish an <em>iMovie</em> commercial either in support of or against their given organisms.</td>
<td>Videos should be assessed for accuracy, use of scientific evidence, professionalism, and collaboration</td>
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<td>19. explore the role of viruses in genetic recombination and gene therapy.</td>
<td>LS3.A, CRP2,4,5,7,11</td>
<td>• complete the “Design a Viral Vector” lesson/activity. Explore the workings of viral DNA, apply understanding to common viruses (HIV, Ebola, etc.), and then design a vector to treat a specified illness.</td>
<td>Student presentations may be assessed using a rubric</td>
<td>Teacher notes can be found at: <a href="http://groups.bme.gatech.edu/groups/ledoux/pbl/module2/TP2.pdf">http://groups.bme.gatech.edu/groups/ledoux/pbl/module2/TP2.pdf</a></td>
</tr>
<tr>
<td>PROFICIENCY / OBJECTIVE</td>
<td>Standards</td>
<td>SUGGESTED ACTIVITY</td>
<td>EVALUATION/ ASSESSMENT</td>
<td>TEACHER NOTES</td>
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<tr>
<td>The student will be able to:</td>
<td>Students will:</td>
<td>20. explore the role of genetic variation in evolutionary processes.</td>
<td>• explore evolution from a genomic perspective using antibiotic resistance as a model. Using PBS resources, students will watch video clips regarding drug resistant strains of TB, conduct public health awareness surveys in your own community, and engage in a simulated public health campaign to raise awareness about the evolution of resistant bacteria.</td>
<td>Public health campaigns may be assessed using a rubric PBS resources can be found at - <a href="http://www.pbs.org/wgbh/evolution/educators/lessons/lesson6/act1.html">http://www.pbs.org/wgbh/evolution/educators/lessons/lesson6/act1.html</a></td>
</tr>
</tbody>
</table>
BIBLIOGRAPHY

WEBSITES
http://sciencesupport.net/genpblwhosdaddywhole.pdf
http://www.pbs.org/wgbh/nova/education/activities/0401_02_nsn.html
http://www.nuffieldfoundation.org/print/2759
http://www.nuffieldfoundation.org/print/3197
http://www.cdc.gov/excite/ScienceAmbassador/ambassador_pgm/lessonplans_genetics.htm
http://www.nuffieldfoundation.org/print/1645
http://labcenter.dnalc.org/labs/mendeliangenetics/mendeliangenetics_d.html
http://www.nature.com/scitable/topicpage/genetic-dominance-genotype-phenotype-relationships-489
http://ed.fnal.gov/arise/guides/bio/5-Genetics/5a-GeneticsChiSquareAnalysis.pdf
http://evolution.berkeley.edu/evolibrary/news/110301_pcbresistantcod
http://biophysics.illinois.edu/K-12Outreach/Sample_Lessons_files/Name%20That%20Gene%20Lesson%20Plan.pdf
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http://groups.bme.gatech.edu/groups/ledoux/pbl/module2/TP2.pdf
http://www.nytimes.com/2010/03/16/science/16limb.html?_r=0

SUGGESTED ARTICLE
APPENDIX A  SAMPLE AUTHENTIC ASSESSMENT
THE SCIENCE OF A STORY: SCENE 1

Vlad and Mina are sitting down for lunch at a local café. It is a crisp, autumn day in their sleepy little town, and they can see that the hospital across the street is being decorated for Halloween. Suddenly, the wind begins to howl and some thunder booms in the distance. Mina smiles and looks into Vlad’s eyes. She has been waiting all morning to share some interesting information she has recently acquired...

Mina [in an exceedingly excited voice]: Vlad! It’s been so long! I think the last time we saw each other was when we watched that awesome zombie movie...

Vlad: I think you’re right, Mina. It’s good to finally see you again.
Mina: You too, Vlad.
Vlad: So what is it that you wanted to tell me?
Mina: Well, you know how I love learning about the etiology of folklore? Vlad: Yeah...

Mina: And how I love old monster movies, gothic literature and science?
Vlad: Yeah...

Mina: Well, I stopped by the hospital this morning to see my mother at her office, and she told me about a new study that she and her colleagues are doing on porphyria.

Vlad: Huh? What the heck is porphyria?

Mina: Apparently it’s a genetic disorder.

Vlad: Oh. Is that all you had to tell me?

Mina: Heck no! As it turns out, some people have speculated that stories about a popular movie monster arose as a result of this disorder!

Vlad: Huh? What do you mean?
Mina: Basically, without scientific technology, people in the past did the best they could to understand the world around them. Because they didn’t know that porphyria was a genetic disorder, they may have come up with mythical explanations for why individuals with porphyria seemed so different than most others.

Vlad: So without knowledge of genetic disorders, people may have assumed that individuals with porphyria were different because they were monsters?

Mina: Exactly! Isn’t that cool!
Vlad: Totally! So which monster is it?
Mina: Huh?
Vlad: Which monster story is related to porphyria? Mina: Oh shoot... I can’t seem to remember now...

GRAPHIC ORGANIZER #1

<table>
<thead>
<tr>
<th>Big Idea/Problem/Question</th>
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<table>
<thead>
<tr>
<th>Facts From the Scene</th>
<th>Research Items</th>
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</thead>
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</table>
THE SCIENCE OF A STORY: SCENE 2

Feeling pretty badly about her earlier lapse in memory, Mina decides to look for an article that her mother gave her about porphyria and folklore. She finds it and calls Vlad.

Mina [excitedly drowning out Vlad as he answers his phone]: Vlad! It’s me.

Vlad: Hey. What’s up?

Mina: So I found a New York Times article that my mom gave me earlier today, and it turns out that the creature I couldn’t remember was the vampire!

Vlad: Awesome!

Mina: I know, right?! Although there really isn’t any scientific evidence to suggest that the existence of porphyria actually caused people to come up with vampire stories to explain what they were seeing, some people, including this Dr. Dolphin guy from the 1980s, have speculated that they may have been related. In fact, my mom said that there are even whole books dedicated to speculation about how real diseases might have given rise to mythology and folklore! I wonder if I can get my Ph.D. in something like that...?

Vlad: Wait... Do people with porphyria drink blood?!

Mina: No! Dr. Dolphin just suggests that if people had accidentally ingested blood, they may have seen some improvement in their symptoms. However, nobody really knows if anyone was actually drinking blood back then when the stories started. And, as far as I know, doctors today aren’t giving their porphyria patients’ blood as a treatment...

Vlad: Oh, OK. You kind of freaked me out there for a second...

Mina: Regardless, it’s still pretty interesting to think about how the evolution of a mythological creature might have actually started with a real genetic disorder!

Vlad: Totally! Can you send me the article? I want to check out how close this Dr. Dolphin guy’s theory fits with what we know about porphyria.

Mina: Sure. I’ll email it now.

Vlad: By the way, do you know if anyone has challenged this guy’s theory? I mean, this article was written so long ago...
Mina: Hmm... I don’t know the answer to that... However, given how difficult it must be to live with a disorder like porphyria, I have to imagine that some people have taken offense to this theory...

THE SCIENCE OF A STORY: EMAIL

Date: 14 Oct 2010 17:41:15
From: Murray, Mina <fakeemailaddress@gmail.com>
To: Theimpalar, Vlad <anotherfakeemailaddress@gmail.com>
Subject: New York Times Article on Porphyria!

Hi Vlad,
Here’s the link to the article online. Hope you find it as interesting as I did!
Sincerely,
Mina
<table>
<thead>
<tr>
<th>Big Idea/Problem/Question</th>
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<tr>
<th>Facts From the Scene</th>
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</table>

<table>
<thead>
<tr>
<th>Research Items</th>
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<td></td>
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</tbody>
</table>
THE SCIENCE OF A STORY: SCENE 3

Vlad and Mina are eating lunch together at school. Vlad seems distracted and looks troubled...

Mina: Vlad, are you OK? Is there something on your mind?
Vlad: Well, I guess I’ve been feeling bad about our recent conversations... Mina: Really? What do you mean?

Vlad: Here we are getting all excited about a possible connection between the vampire legend and porphyria when there are real people out there who actually have to deal with having this genetic disorder! I mean, although it is interesting stuff, I feel sort of insensitive...

Mina: Wow... I guess I never thought of that. Now I feel bad too...

Vlad: Well, maybe there’s something we can do to balance our interest in the connection between porphyria and folklore with the reality of what it’s like to have this, and even other, genetic disorders...

Mina: I’ve got it! Even though scientists now know a lot more about genetic disorders than people did long ago, there may still be some misconceptions out there. So, we can put together some informational materials that will help people to understand the true nature of genetic disorders!

Vlad: That’s a great idea, Mina! I love educating the public about science.
Mina: Now we just have to figure out what kind of information we want to include...

BROCHURE ASSIGNMENT: HELP VLAD AND MINA EDUCATE THE PUBLIC!

Vlad and Mina need your help! Therefore, we want you and your group members to create an informational brochure about a specific genetic disorder. Each brochure must contain the following bits of information about the genetic disorder: (1) historical interpretation of the disorder (myths, folklore, etc.); (2) major physical symptoms; (3) pattern of inheritance; (4) genetic effects of the inherited mutation; and (5) some basic information about ways to treat the disorder (NOTE: if there are no current treatments for the disorder, you must indicate this in your brochure and say something about research being done to uncover a treatment). Be sure to use APA format for referencing all of your sources (both in-text and in your reference list). This also includes giving credit to the owners of any pictures you use.
## BROCHURE RUBRIC

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>WEIGHT</th>
<th>PROFESSIONAL</th>
<th>ADEQUATE</th>
<th>NEEDS WORK</th>
<th>UNSATISFACTORY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content</td>
<td>50%</td>
<td>□ Demonstrates in depth understanding of topic</td>
<td>□ Demonstrates understanding of the topic</td>
<td>□ Demonstrates little understanding of topic</td>
<td>□ Lacks understanding of topic</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Accurately utilizes researched information in the brochure</td>
<td>□ Employs research information with an adequate degree of accuracy</td>
<td>□ Employs research information with a fair degree of accuracy</td>
<td>□ Reports only the most basic parts of the information</td>
</tr>
<tr>
<td>Written</td>
<td>20%</td>
<td>□ Well organized content</td>
<td>□ Content is organized</td>
<td>□ Content lacks organization</td>
<td>□ Unorganized content</td>
</tr>
<tr>
<td>Presentation</td>
<td></td>
<td>□ Attractive and well-designed format</td>
<td>□ Format is adequate</td>
<td>□ Format is difficult to follow and poorly organized</td>
<td>□ Hard to follow</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Clear and easily understood message</td>
<td>□ Message is sufficiently understood</td>
<td>□ Message not clearly understood</td>
<td>□ Message difficult to understand; tendency to wander or ramble</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Computer generated with strong visual appeal</td>
<td>□ Computer generated with acceptable eye appeal</td>
<td>□ Computer generated but poorly designed</td>
<td>□ Handwritten or computer generated with little organization or skill</td>
</tr>
<tr>
<td>Research</td>
<td>15%</td>
<td>□ Five sources used</td>
<td>□ Three sources used</td>
<td>□ Two sources used</td>
<td>□ Less than two sources used</td>
</tr>
<tr>
<td>Quality</td>
<td></td>
<td>□ Use of reliable sources</td>
<td>□ Sources have some reliability</td>
<td>□ Questionable reliability of sources</td>
<td>□ Little reliability of sources</td>
</tr>
<tr>
<td></td>
<td></td>
<td>□ Accurate analysis of research</td>
<td>□ Adequate analysis of research</td>
<td>□ Basic information with questionable accuracy</td>
<td>□ Inaccurate information</td>
</tr>
<tr>
<td>Visual</td>
<td>15%</td>
<td>□ Imaginative; original</td>
<td>□ Creativity is acceptable</td>
<td>□ Little creativity used</td>
<td>□ No originality</td>
</tr>
<tr>
<td>Appeal</td>
<td></td>
<td>□ Use of graphics make the message “come alive”</td>
<td>□ Use of graphics adequate to present message</td>
<td>□ Poor selection of graphics</td>
<td>□ Graphics do not tie in with the message</td>
</tr>
</tbody>
</table>
APPENDIX B  SAMPLE LAB RUBRIC
# LAB REPORT SCORE SHEET

Name ____________________________________________  Section ________  Date __________

Lab partners ____________________________________________

<table>
<thead>
<tr>
<th>CATEGORY</th>
<th>SCORING CRITERIA</th>
<th>POINTS</th>
<th>TEACHER EVALUATION</th>
</tr>
</thead>
</table>
| Title (2) | A clear title is present  
Student name, class, and date are present | 2 |  |
| Introduction Purpose and Hypothesis (4) | The purpose is clearly stated | 2 |  |
| | The hypothesis is stated, clearly shows that it is based on research *(not just a wild guess)* and is written in the formal format | 2 |  |
| Introduction Background (10) | Thoroughly and accurately answers the relevant questions discussed in class/in the pre-lab handout; Provides relevant background information to justify hypothesis. | 6 |  |
| | All biological concepts related to the experiment are justified/explained. DV, IV, CG are identified. | 4 |  |
| Materials & Methods (3) | Presents easy-to-follow steps which are logical and adequately detailed | 3 |  |
| Data & Results (4) | Data table(s) and graph(s) are complete, accurate, and appropriately labeled. Data is summarized in paragraph format. | 4 |  |
| Discussion/ Conclusion (20) | States a conclusion based on the hypothesis and purpose (supports or rejects hypothesis) | 4 |  |
| | The data is analyzed in an appropriate way and is related to the hypothesis and purpose | 8 |  |
| | Identifies sources of error (not human) and explains the effects on results | 4 |  |
| | Presents suggestions on experiment improvement and further studies to be done | 4 |  |
| Presentation (7) | Report is typed, no larger than 12 font, 1.5 spacing and margins of 1” | 1 |  |
| | Logically sequenced; Lab report sections clearly distinct from each other | 1 |  |
| | All grammar and spelling are correct. Use of paragraphs aids organization. | 1 |  |
| | Uses proper tense, voice, and person. | 1 |  |
| | Lab report is submitted on time. | 3 |  |
| | **TOTAL** | **50** |  |

32
APPENDIX C: NJSLS STANDARDS

3 - English Language Arts  
4 - Mathematics     
5 - Science         
8 - Technology      
9 - 21st Century Life and Careers
APPENDIX D: CURRICULUM MODIFICATIONS & ADAPTATIONS
There is no recipe for adapting general education curriculum to meet each student’s needs. Each teacher, each student, each classroom is unique and adaptations are specific to each situation.

Keep in mind that curriculum does not always need to be modified. By providing multi-level instruction you will find that adapting a lesson may not always be necessary. Differentiating instruction and providing multiple ways assess allows more flexibility for students to meet the standards and requirements of the class. At other times, the curriculum can be made more accessible through accommodations. In addition, supports for one student may not necessarily be the same in all situations, e.g., a student who needs full time support from a paraprofessional for math may only need natural supports from peers for English, and no support for art. And, supports should not be determined by the disability label, instead supports should be used when the instructional or social activity warrants the need for assistance. (Fisher and Frey, 2001).

The forms and examples on the following pages provide information about curriculum and types of adaptations that could be considered in developing the appropriate strategy for a particular student. Examples are provided for both elementary and secondary levels.
A Curricular Adaptation and Decision-making Process

This decision-making flowchart can be used to conceptualize the process of selecting and implementing curricular adaptations. It should be used as a tool for a team in determining an individual student’s needs.

1. Identify the student’s individual educational goals and objectives to be emphasized during general education activities

2. Articulate the expectations for the student’s performance in general education activities

3. Determine what to teach
   As a team, determine the content of the general education activity, theme or unit study

4. Determine how to teach
   As a team, determine if, without modification, the student can actively participate and achieve the same essential outcomes as non-disabled classmates. If the student cannot achieve the same outcomes...

5. Select of design appropriate adaptations

6. If the above adaptation strategies are not effective, design an alternative activity

7. Evaluate effectiveness of adaptations

Select instructional arrangement | Select lesson format | Employ student-specific teaching strategies | Select curricular goals specific to the lesson | Engineer the physical and social classroom environment | Design modified materials | Select natural supports and supervision arrangements
A Curricular Adaptation and Decision-making Model

Examine the Structure of the Instruction

1. Can the student actively participate in the lesson without modification? Will the same essential outcome he achieved?
2. Can the student’s participation be increased by changing the instructional arrangement?
   - From traditional arrangements to:
     - Cooperative groups
     - Small groups
     - Peer partners
     - Peer or cross-age tutors
3. Can the student’s participation be increased by changing the lesson format?
   - Interdisciplinary/thematic units
   - Activity-based lessons, games, simulations, role-plays
   - Group investigation or discovery learning
   - Experiential lessons
   - Community-referenced lessons
4. Can the Student’s participation and understanding be increased by changing the delivery of instruction or teaching style?

Examine the Demands and Evaluation Criteria of the Task

5. Will the student need adapted curricular goals?
   - Adjust performance standards
   - Adjust pacing
   - Same content but less complex
   - Similar content with functional/direct applications
   - Adjust the evaluation criteria or system (grading)
   - Adjust management techniques

Examine the Learning Environment

6. Can the changes he made in the classroom environment or lesson location that will facilitate participation?
   - Environmental/physical arrangements
• Social rules
• Lesson location

**Examine the Materials for Learning**

7. Will different materials be needed to ensure participation?
   • Same content but variation in size, number, format
   • Additional or different materials/devices
   • Materials that allow a different mode of input
   • Materials that allow a different mode of output
   • Materials that reduce the level of abstraction of information

**Examine the Support Structure**

8. Will personal assistance be needed to ensure participation?
   • From peers or the general education instructor?
   • From the support facilitator’?
   • From therapists’?
   • From paraprofessionals?
   • From others?

**Arrange Alternative Activities that Foster Participation and Interaction**

9. Will a different activity need to be designed and offered for the student and a small group of peers?
   • In the classroom
   • In other general education environments
   • In community-based environments

Curriculum Adaptations

It is important to correlate adaptations with the IEP. In other words, we are not adapting for adaptations sake but, to meet the student’s needs as identified on an IEP.

<table>
<thead>
<tr>
<th>a. Curriculum as is.</th>
<th>Move in this direction only when necessary</th>
</tr>
</thead>
<tbody>
<tr>
<td>This is the type we forget most frequently. We need to constantly be looking at the general education curriculum and asking if the students on IEPs may gain benefit from participating in the curriculum as is. We need to keep in mind that incidental learning does occur. Curriculum as is supports outcomes as identified in standard curriculum.</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>b. Different objective within the same activity and curriculum.</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>The student with an IEP works with all the other students in the classroom participating in the activity when possible but, with a different learning objective from the other students. This is where the principle of partial participation fits. Examples include:</td>
<td></td>
</tr>
<tr>
<td>• A student with a short attention span staying on task for 5 minutes.</td>
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<tr>
<td>• Using a switch to activate a communication device to share during a class discussion.</td>
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<tr>
<td>• Expressing one’s thoughts by drawing in a journal instead of writing.</td>
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<tr>
<td>• Holding a book during reading time.</td>
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<tr>
<td>• Understanding the effect World War II has on the present rather than knowing the names and dates of key battles.</td>
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</table>

<table>
<thead>
<tr>
<th>c. Material or environmental adaptations.</th>
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</thead>
<tbody>
<tr>
<td>The material or environmental changes are utilized so that participation in the general education curriculum by the student with the IEP may occur. Examples include:</td>
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<tr>
<td>• 5 spelling words from the weekly list instead of the standard 20.</td>
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<tr>
<td>• Completing a cooking assignment by following picture directions rather than written directions.</td>
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<tr>
<td>• Changing the grouping of the class from large group to small groups (possible with the additional support staff).</td>
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</tr>
<tr>
<td>• Changing the instructional delivery from lecture to the cooperative learning format.</td>
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<tr>
<td>• Using a computer to write an assignment instead of paper and pencil.</td>
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</tr>
<tr>
<td>• Reading a test to a student.</td>
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<tr>
<td>• Highlighting the important concepts in a textbook.</td>
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<tr>
<td>• Having the student listen to a taped textbook.</td>
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<tr>
<td>• Using enlarged print.</td>
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<tr>
<td>• Using an assistive technology device.</td>
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<tr>
<td>• Using visual cues such as picture and/or word schedules for those who have difficulty staying on task.</td>
<td></td>
</tr>
<tr>
<td>• Using a note taking guide listing the key concepts during a lecture.</td>
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</tbody>
</table>
**d. Providing Physical assistance.** Assistance from another person may be needed for a student to participate in a classroom activity. If possible, it is better to use natural supports (peers) as these will be the people always present in the student’s life. If the use of peers is not possible, then either the support teacher, the paraprofessional, the classroom teacher, the classroom aide, or a parent volunteer may provide the assistance. Most peers and staff will need training in the correct way of providing physical assistance. In addition, we need to keep in mind the principle of partial participations. Examples include:

- Starting a computer for an student with an IEP to use.
- Guiding a hand during handwriting.
- Assisting in activating a switch.
- Completing most of the steps of an activity and having a student with an IEP do the remainder
- Pushing a student in a wheelchair to the next activity.

**e. Alternative/substitute curriculum.** This is sometimes referred to as functional curriculum as it usually involves the acquisition of “life skills.” The decision to use alternative/substitute curriculum is a major change and needs to be reflected on the IEP. This decision should be carefully made after weighing all of the pros and cons of using an alternative curriculum. The alternative curriculum may or may not take place in the general education classroom. Examples include:

- Community-based instruction (which all students may benefit from!)
- Learning job skills in the school cafeteria.
- Learning how to use a communication device.
- Doing laundry for the athletic department
- Learning cooking/grooming skills at the home.

Overlap does occur among the five types of curriculum adaptations.

## Nine Types of Adoptions

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapt the way instruction is delivered to the learner.</td>
<td>Adapt how the learner can respond to instruction</td>
<td>Adapt the time allotted and allowed for learning, task completion or testing.</td>
</tr>
<tr>
<td><em>For example:</em> Use different visual aids; plan more concrete examples; provide hands-on activities; place students in cooperative groups.</td>
<td><em>For example:</em> Allow a verbal vs. written response; use a communication book for students; allow students to show knowledge with hands-on materials.</td>
<td><em>For example:</em> Individualize a timeline for completing a task; pace learning differently (increase or decrease) for some learners.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Difficulty</th>
<th>Level of Support</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapt the skill level, problem type, or the rules on how the learner may approach the work.</td>
<td>Increase the amount of personal assistance with specific learner.</td>
<td>Adapt the number of items that the learner is expected to learn or complete.</td>
</tr>
<tr>
<td><em>For example:</em> Allow a calculator for math problems; simplify task directions; change rules to accommodate learner needs.</td>
<td><em>For example:</em> Assign peer buddies, teaching assistants, peer tutors or cross-age tutors.</td>
<td><em>For example:</em> Reduce the number of social studies terms a learner must learn at any one time.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Degree of Participation</th>
<th>Alternate Goals</th>
<th>Substitute Curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adapt the extent to which a learner is actively involved in the task.</td>
<td>Adapt the goals or outcome expectations while using the same materials.</td>
<td>Provide the different instruction and materials to meet a learner’s individual goals.</td>
</tr>
<tr>
<td><em>For example:</em> In geography, have a student hold the globe, while others point out the locations.</td>
<td><em>For example:</em> In social studies, expect one student to be able to locate just the states while others learn to locate capitals as well.</td>
<td><em>For example:</em> Individualize a timeline for completing a task; pace learning differently (increase or decrease) for some learners.</td>
</tr>
</tbody>
</table>

Adaptations

Creating Ways to Adapt Familiar Lessons - Elementary

1. Select the subject area (and grade level) to be taught:
   reading  math  science  social studies  writing  music  health  P.E.  art
   Grade Level: ............................

2. Select the lesson topic to be taught (on one day):

3. Briefly identify the curricular goal for most learners: By the end of this class, most students will know
   ............................................................................................................................

4. Briefly identify the instructional plan for most learners: As teacher, I will .................................
   ............................................................................................................................

5. Identify the name(s) of the learner(s) who will need adaptations in the curriculum or instructional plan:
   ............................................................................................................................

6. Now use “Nine Types of Adaptations” as a means of thinking about some of the ways you could adapt what
   or how you teach to accommodate this learner in the classroom for this lesson.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty</td>
<td>Level of Support</td>
<td>Size</td>
</tr>
<tr>
<td>Degree of Participation</td>
<td>Alternate Goal</td>
<td>Substitute Curriculum</td>
</tr>
</tbody>
</table>
Creating Ways to Adapt Familiar Lessons - Elementary

1. Select the subject area (and grade level) to be taught:

   reading  math  science  social studies  writing  music  health  P.E.  art

   Grade Level: ...

2. Select the lesson topic to be taught (on one day): **Vocabulary comprehension**

3. Briefly identify the curricular goal for most learners: By the end of this class, most students will know ...

   the meaning of new vocabulary works from their story ...

4. Briefly identify the instructional plan for most learners: As teacher, I will ask students to complete a matching activity in which they match words and definitions on paper. The students will also choose one word and write a sentence using the word on the bottom of their paper.

5. Identify the name(s) of the learner(s) who will need adaptations in the curriculum or instructional plan: **Kim**

6. Now use “Nine Types of Adaptations” as a means of thinking about some of the ways you could adapt what or how you teach to accommodate this learner in the classroom for this lesson.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place students in cooperative groups and divide the task between group members. Each member teaches their vocabulary work to team members.</td>
<td>Allow the student to record all or part of the assignment on tape.</td>
<td>Ask the student to complete the assignment at home and return it the next day.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Difficulty</th>
<th>Level of Support</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select different vocabulary words for the student to learn; words that are less difficult or in some cases more difficult.</td>
<td>Ask a classmate, peer tutor or teaching assistant to assist in completing the assignment.</td>
<td>Select fewer (or more) words for the student to learn, but leave the assignment the same as for other students.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Degree of Participation</th>
<th>Alternate Goal</th>
<th>Substitute Curriculum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ask the student to check classmates’ definitions against as answer key.</td>
<td>Set the goal as being to write the words only, or being able to pronounce the words, or just listening to the words and definitions.</td>
<td>Choose a different story for the student to read and identify one or several words the learner needs to know.</td>
</tr>
</tbody>
</table>
Creating Ways to Adapt Familiar Lessons - Secondary

1. Select the subject area (and grade level) to be taught:
   - math
   - science
   - history
   - literature
   - business
   - P.E.
   - fine arts
   - health
   Grade Level: .............................

2. Select the lesson topic to be taught (on one day):

3. Briefly identify the **curricular** goal for most learners: By the end of this class, most students will know .................................................................

4. Briefly identify the **instructional** plan for most learners: As teacher, I will .................................................................

5. Identify the name(s) of the learner(s) who will need adaptations in the curriculum or instructional plan:

6. Now use “Nine Types of Adaptations” as a means of thinking about some of the ways you could adapt what or how you teach to accommodate this learner in the classroom for this lesson.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty</td>
<td>Level of Support</td>
<td>Size</td>
</tr>
<tr>
<td>Degree of Participation</td>
<td>Alternate Goal</td>
<td>Substitute Curriculum</td>
</tr>
</tbody>
</table>
SAMPLE FORM

Creating Ways to Adapt Familiar Lessons - Secondary

1. Select the subject area (and grade level) to be taught:
   math  science  history  literature  business  P.E.  fine arts  health
   Grade Level: 10

2. Select the lesson topic to be taught (on one day): **Concept comprehension**

3. Briefly identify the *curricular* goal for most learners: By the end of this class, most students will be able to define and explain the relevance of five concepts from their text chapter.

4. Briefly identify the *instructional* plan for most learners: As teacher, I will ask the students to read the chapter, identify five key concepts and write a short paragraph describing each concept they have chosen.

5. Identify the name(s) of the learner(s) who will need adaptations in the curriculum or instructional plan:
   John

6. Now use “Nine Types of Adaptations” as a means of thinking about some of the ways you could adapt what or how you teach to accommodate this learner in the classroom for this lesson.

<table>
<thead>
<tr>
<th>Input</th>
<th>Output</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provide a review of the chapter prior to having the student complete the written work.</td>
<td>Allow the student to use a tape recorder to dictate the assignment instead of having to write the answers.</td>
<td>Allow the student an extra day to complete the task either in study hall or at home.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Difficulty</th>
<th>Level of Support</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify the key concepts for the student but keep the remainder of the assignment the same.</td>
<td>Place the students in cooperative groups to complete this assignment. Group members can assist the student with reading or writing.</td>
<td>Select fewer or more concepts for the student to learn, but leave the assignment the same as for other students.</td>
</tr>
</tbody>
</table>

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<tr>
<th>Degree of Participation</th>
<th>Alternate Goal</th>
<th>Substitute Curriculum</th>
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</thead>
<tbody>
<tr>
<td>Ask the student to pick out related books from the library that will provide supplementary information for classmates.</td>
<td>Set the goal as being to write the key concept words only, or being able to pronounce the words, or just listening to the words and descriptions.</td>
<td>During this lesson the student can work on keyboarding skills in the computer lab.</td>
</tr>
</tbody>
</table>

*Center for School & Community Integration, Institute for the Study of Developmental Disabilities, Indiana University, Bloomington, IN*
### Thematic Lesson Plan

<table>
<thead>
<tr>
<th>School Name</th>
<th>Class:</th>
<th>Unit:</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Student Name:</th>
<th>Room:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age:</td>
<td></td>
</tr>
<tr>
<td>Grade:</td>
<td></td>
</tr>
<tr>
<td>Parent/Guardian:</td>
<td>Phone:</td>
</tr>
<tr>
<td>Classroom Teacher:</td>
<td></td>
</tr>
<tr>
<td>Inclusion Support Teacher:</td>
<td></td>
</tr>
<tr>
<td>Major standards, objectives and expectations for the unit</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials, books, media, worksheets, software, etc.</th>
<th>Items requiring accommodations and/or modifications</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Instructional arrangements, Time and opportunities for large group, small group, core group, learning centers, individual activities, non-classroom instruction. Does it change day to day? Explain:</th>
<th>Items requiring accommodations and/or modifications</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Projects, supplemental activities, and homework</th>
<th>Items requiring accommodations and/or modifications</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Assessments(s) and final products, Summarize actual student performance (attach examples as appropriate) on the reverse.</th>
<th>Items requiring accommodations and/or modifications</th>
</tr>
</thead>
</table>
# Sample Form

## Thematic Lesson Plan

**School Name:** Palm View Elementary  
**Class:** Social Studies  
**Unit:** More Alike Than Different  
**Room:** 21

**Student Name:** Corey Santos  
**Age:** 8  
**Grade:** 2  
**Parent/Guardian:** Ms. Anita Santos  
**Phone:** 555-5432  
**Classroom Teacher:** Mr. Sean Garrett  
**Inclusion Support Teacher:** Ms. Tangela Hunter

### Major standards, objectives and expectations for the unit
1. Understand why personal and civic responsibility are important.  
2. Understand the cultural traditions and contributions of various societies and groups.  
3. Display appreciation of diversity in our society, including cultural, gender, and ability.

### Materials, books, media, worksheets, software, etc.
1. Children's books on topic  
2. "Chocolates" posterboard (Activities for a Diverse Classroom)  
3. Family interview questions  
4. Slides and overheads

### Instructional arrangements, time and opportunities for large group, small group, co-op group, learning centers, individual activities, non-classroom instruction. Does it change day to day? Explain:
1. Large group for read aloud  
2. Interactive lessons using various media  
3. Cooperative groups to complete Hyperstudio project  
4. Small group for chocolate activity

### Projects, supplemental activities, and homework
1. "Box of Chocolates" activity (Activities for a Diverse Classroom)  
2. Hyperstudio group project: Are We More Alike Than Different?  
3. Homework - Family interview

### Assessment(s) and final products. Summarizes actual student performance (attach samples as appropriate) on the reverse:
1. Completion of group activities  
2. Rubric for Hyperstudio presentation  
3. Family interview

### Items requiring accommodations and/or modifications
1. Some books on tape  
2. Highlighted posterboard  
3. Fewer questions - done on audio tape

### Items requiring accommodations and/or modifications
2. Modify if necessary  
3. Paraprofessional assistance with computer

### Items requiring accommodations and/or modifications
1. Highlight posterboard of key points  
2. Select task items as student's instructional level  
4. Provide word bank or magazine pictures

### Items requiring accommodations and/or modifications
1. Assess on use of language  
2. Modify rubric
# Thematic Lesson Plan

**School Name:** Palm View Elementary  
**Class:** Language Arts  
**Unit:**  
One Book, Two Book, Red Book, Blue Book: Author Study of Dr. Seuss  
**Room:** 21

**Student Name:** Cory Santos  
**Age:** 8  
**Grade:** 2  
**Parent/Guardian:** Ms. Anita Santos  
**Phone:** 555-5432  
**Classroom Teacher:** Mrs. Sean Garrett  
**Inclusion Support Teacher:** Ms. Tangela Hunter

**Major standards, objectives and expectations for the unit**
1. Increase comprehension by rereading, retelling, and discussion.
2. Determine the main idea in nonprint communication.
3. Write, question, and make observations about familiar topics, stories, and new experiences.
4. Recognize personal preferences in literature.

<table>
<thead>
<tr>
<th>Items requiring accommodations and/or modifications</th>
</tr>
</thead>
</table>
| 1. Pictures available for use in journal  
2. Picture vocabulary writing program  
3. Taped readings of source materials |

**Materials, books, media, worksheets, software, etc.:**
1. Dr. Seuss books;  
2. Formatted reflective journal;  
3. Summary sheet to be completed on each book;  
4. Family response journal (homework);  
5. Video versions of Dr. Seuss books;  
6. Computer - ClarisWorks program;  
7. Biographical source materials

**Instructional arrangements, time and opportunities for large group, small group, large group, learning centers, individual activities, non-classroom instruction.**

**Instructional arrangements**
Does it change day to day? Explain:
1. Large group for K-W-L chart;  
2. Large group read aloud;  
3. Read-write-pair-share;  
4. Individual journal writing,  
5. Partner research in media center;  
6. Concept web of themes;  
7. Small group editing

**Projects, supplemental activities, and homework**
1. Read 2 books - parents and child write in response journal (homework);  
2. Choose 4 books from list (one must be a video), analyze for common themes;  
3. Analyze for a kindergarten, then read aloud to him or her

**Assessment(s) on final products:** Summarize actual student performance (attach examples as appropriate) on the reverse.
1. Reflective journal entries  
2. Author project rubric of presentation  
3. Self-assessment of kindergarten reading  
4. Portfolio selection

**Items requiring accommodations and/or modifications**
1. Preview for prior knowledge  
2. Picture schedule of activity  
3. Design with sentence stems  
4. Create list of materials to locate  
5. Pictures for web  
6. Picture checklist of process  
7. Parent tips for activity  
8. Assistance in selecting books  
9. Reduce rubric to focus on thematic analysis  
10. Use pictures to support self-assessment

PEAK Parent Center, Inc. 1999
## Academic Unit Lesson Plan

<table>
<thead>
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<th>School Name</th>
<th>Class:</th>
<th>Unit:</th>
</tr>
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</table>

<table>
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<tr>
<th>Student Name:</th>
<th>Class Schedule:</th>
<th>Room:</th>
</tr>
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<tbody>
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</thead>
</table>
### Academic Unit Lesson Plan

**Example for student Kelley Glass**

<table>
<thead>
<tr>
<th>School Name:</th>
<th>Central Class Biology Unit: The Cell</th>
</tr>
</thead>
</table>

**Student Name:** Kelley Glass  
**Age:** 15  
**Grade:** 10  
**Parent/Guardian:** Ms. Rebecca Glass  
**Phone:** 555-1234  
**Advocate Teacher:** Mr. David Porter  
**Classroom Teacher:** Ms. Janina Foulke

**Class Schedule:**  
- Block 1: Math  
- Block 2: English  
- Block 3: Biology  
- Block 4: World Geography  
- Block 5: 3-D Art

**Room:**
- Block 1: Math  
- Block 2: English  
- Block 3: Biology  
- Block 4: World Geography  
- Block 5: 3-D Art

**Major standards, objectives and expectations for the unit:**
1. Students will understand the structure and function of the cell.
2. Students will identify the parts of the cell.
3. Students will identify how cells are organized in multi-cellular organisms.

**Materials, books, media, worksheets, software, etc.:**
1. Book: Modern Biology
2. Educational videocassettes related to chapter contents
3. Art supplies for cell projects
4. Chapter workbooks
5. Primary source: Science magazine article on the cell
6. Local biology professor to discuss current research on cells

**Items requiring adaptations and/or modifications:**
1. Order textbook from publisher on cassette.
2. Modify workbooks to emphasize key points of chapters.
3. Record science magazine article on audio tape.

**Instructional arrangements:** Time and opportunities for large group, small group, coop group, learning centers, individual activities, non-classroom instruction. Does it change day to day? Explain

1. Large group instruction with overheads to introduce the cell
2. Small groups to complete labs, worksheets, mind map, and chapter review
3. Two cell labs will be completed in partners (onion skin & Jell-O)
4. Individual time to complete illustrated vocabulary

**Projects, supplemental activities, and homework:**
1. Homework: Complete vocabulary, bring in Jell-O cell food items
2. "Design a cell" and "Parts of the cell" group projects & presentations
3. Write-up for each completed lab with illustrations

**Items requiring adaptations and/or modifications:**
1. Copy of teacher's overhead transparencies given to student
2. Poor takes notes and highlights key points; student types on to computer for both
3. Use of "Read, write, pair, share" strategy (see description on page 12) as chapter review

**Assessment(s) and final products:** Summarize actual student performance (attach examples as appropriate) on the reverse.

1. Add illustrated vocabulary words to class portfolio
2. Culminating activity: "Design a cell" and "Parts of the cell" projects
3. Chapter test

**Items requiring adaptations and/or modifications:**
3. Chapter test read orally with additional time given, reducing the number of options for multiple choice questions to focus on major concepts, and providing options for short answer questions.

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PEAK Parent Center, Inc. 1999
### SAMPLE FORM

#### Academic Unit Lesson Plan

<table>
<thead>
<tr>
<th>School Name: Central</th>
<th>Class Schedule: Block 1: Math</th>
<th>Room: 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class: Sophomore English</td>
<td>Block 2: English</td>
<td>147</td>
</tr>
<tr>
<td>Unit: Of Mice and Men</td>
<td>Block 3: Biology</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Block 4: World Geography</td>
<td>150</td>
</tr>
<tr>
<td></td>
<td>Block 5: 3-D Art</td>
<td>17</td>
</tr>
</tbody>
</table>

#### Student Name: Kelley Glass

**Age:** 15

**Grade:** 10

**Parent/Guardian:** Ms. Rebecca Glass, Phone: 555-1212

**Advocate Teacher:** Mr. David Porter

**Classroom Teacher:** Mrs. Sally Moore

#### Major standards, objectives, and expectations for the unit

1. Students will evaluate their beliefs related to prejudice and diversity.
2. Students will learn about the plight of the migrant farm worker.
3. Students will learn about the times during the Depression and the time period in which Steinbeck did his writing.

#### Materials, books, media, worksheets, software, etc.

1. Copy of the short story "The Circuit" by Francisco Sánchez
2. Copy of the novel Of Mice and Men by John Steinbeck
3. Worksheets for each of the six chapters
4. Video of the book Of Mice and Men
5. Video camera
6. "I Am" Poem to use with "The Circuit"
7. "Open Mind" worksheet (see activity under Projects)
8. Circle of Friends worksheet (see activity under Projects)

#### Instructional arrangements: Time and opportunities for large group, small group, group, learning centers, individual activities, non-classroom instruction

1. Large group instruction for introduction of the time period, Steinbeck, the Depression and migrant farm workers; use of opening question in Socratic dialogue format: Am I my brother’s keeper?
2. Small groups for "I Am" poem for "The Circuit"
3. Student pairs to complete worksheets
4. Large group presentation for trial for George (with every student having a part in the trial)

#### Projects, supplemental activities, and homework

1. Complete a chapter worksheets
2. "I Am" poem on short story "The Circuit" Students complete outline of poem, format that includes descriptive phrases, parallel structure, and constructive thinking
3. Simulation trial of George for killing Lennie
4. Homework: rehearse roles in trial, some reading of novel at home
5. Illustration of vocabulary words
6. "Open Mind" activity: students fill in thoughts from the perspective of specified characters
7. Circle of Friends activity: students complete circular diagram to identify their relationships with family and friends; students complete similar diagram for Lennie's character (from "Of Mice and Men"

#### Assessment(s) and final products: Summarize actual student performance

- Trial presentation/video taped
- Objective test
- Evaluation essay

---

**Items requiring adaptations and/or modifications**

1. Audio/visual tape recorder of the short story "The Circuit"
2. Audio/visual tape recorder of the novel Of Mice and Men
3. Reformat chapter summary worksheets and comprehension questions using outlines, pictures, or visual format

1. Peer takes notes in class; student types notes on computer for both

1. Reformatted worksheets completed on computer with the peer tutor
2. Give options for responses for completing poems (3 choices for each line of the poem)
3. Listen to audio/visual tape and/or family members read book
4. Rehearse part in play with picture cues and cards
5. Word bank to use for completing "Open Mind" activity

---

**Items requiring adaptations and/or modifications**

1. Reformatted worksheets completed on computer with the peer tutor
2. Give options for responses for completing poems (3 choices for each line of the poem)
3. Listen to audio/visual tape and/or family members read book
4. Rehearse part in play with picture cues and cards
5. Word bank to use for completing "Open Mind" activity