

08-69 App-3/10/09

Senate App-3/24/09

Undergraduate Distance Education Review Form

(Required for all courses taught by distance education for more than one-third of teaching contact hours.)

Existing and Special Topics Course

Received

Course: PSYC481 – Special Topics: Psychology of Music

FEB 16 2009

Instructor(s) of Record: Donald U. Robertson

Liberal Studies

Phone: 724-357-4522

Email: durobert@iup.edu

Step One: Proposer

A. Provide a brief narrative rationale for each of the items, A1- A5.

1. How is/are the instructor(s) qualified in the distance education delivery method as well as the discipline?

Subject Matter Qualifications. I have taught at IUP since 1981, tenured in 1986, promoted to full professor in 1987, hold a Ph.D. in psychology, and am a member of the graduate faculty qualified to teach at the doctoral level. In the last five years I have become increasingly active in the general field of the psychology of music. I am a member of professional organizations in psychology (American Psychological Association, Association for Psychological Science), psychology and music (Society for Education, Music and Psychology Research; the Performing Arts and Medicine Association) and music (the National Association for Music Education – MENC, Pennsylvania Music Education Association – PMEA).

My work in the area of the psychology of music led me to offer an honor's seminar on the psychology of music in 2006. Since that time students have become involved in psychology of music research; I supervised two undergraduate honor's theses and one dissertation that addressed issues in the psychology of music. I have also taught special sections of general psychology for music majors in which examples from the psychology of music are used to illustrate general psychological principles.

My research and the development of a model of performance anxiety in musicians have led to a number of professional presentations at state, regional and international meetings. They include presentations for the International Trumpet Guild, the Performing Arts and Medicine Association, PMEA, MENC-East region, and the Eastern Psychological Association. I also am first author on two manuscripts, one under review for the Music Educators Journal and the other for Medical Problems of Performing Artists.

Distance Education Delivery Qualifications. During my tenure at IUP I have integrated my research and teaching activities with computer-based technologies. For example, early in my career I was awarded an IUP Senate grant to develop a computer-based tutorial for learning a statistical package (BMDP). My computer skills have continued to grow since that time to keep pace with the rapidly changing technologies.

In my most recent work, I have employed audio and video editing technologies (Cakewalk and Vegas) to produce stimulus materials for my research and to edit and produce materials for professional presentations. I have also used these technologies to produce materials for PowerPoint classroom

presentations. Last semester I began using Turnitin, the IUP supported plagiarism software, to aid evaluation of student papers.

I first participated in WebCT in 2006. Since that time my needs for computer assisted course management could be accomplished through a combination of e-mail, textbook publisher websites, and IUP's P-drive. I recently switched to WebCT for course management because a test publisher began charging for access to their site. Through IUP's on-line support and web-based tutorials, I have refreshed what I knew about WebCT and learned about features added since my initial introduction. In order to continue learning, I have registered for the 4-day WebCT training offered by IUP's IT group in March 2009.

2. How will each objective in the course be met using distance education technologies?

Course objectives are identified in the syllabus. The objectives correspond to specific modules and activities associated with the modules. The following table shows the correspondence between objectives, modules, course content, and evaluation methods.

Objective	Module	Content ¹	Evaluation
1. Describe the origins of music and its role in society.	1	R&B 1, 2, 3 Levitin Intro. and 9 2 lectures	2 assignments 1 quiz ½ Unit 1 exam
2. Describe the physical properties of sound and the sensory process of transduction.	2	R&B 4 Levitin 1 3 lectures	2 assignments 1 quiz ½ Unit 1 exam
3. Explain the psychological and neuropsychological basis for perception and processing of pitch, harmony, melody, and rhythm.	3 & 4	R&B 5, 6 Levitin 2, 3, 4 5 lectures	4 assignments 2 quizzes Unit 2 exam
4. Describe factors related to the development of musical ability and judge the relative contributions of talent and experience to musical development.	5	R&B 10 Levitin 7 3 lectures	2 assignments 1 quiz ½ Unit 3 exam
5. Identify psychological factors that influence music performance.	6	R&B 7 2 lectures	2 assignments 1 quiz ½ Unit 3 exam
6. Summarize the relationships among music, emotion, and interpersonal processes.	7 & 8	R&B 8, 9 Levitin 6, 8 5 lectures	4 assignments 1 quiz Unit 4 exam

1. R&B refers to the text Radocy, R. E., & Boyle, J. D. (2003). *Psychological foundations of musical behavior*. (4th ed.). Springfield, IL: Charles C. Thomas. Levitin refers to the text Levitin, D. J. (2006). *This is your brain on music: The science of a human obsession*. New York: Penguin.

Comments on distance education technologies. There are some aspects of the distance education technology that are particularly well suited to a course in the psychology of music. Many of the concepts are more easily understood if sound is used to illustrate a particular phenomenon. For example, very young children (e.g., under 1 year of age) respond to melodic contour and not absolute

pitch. The effect is more easily understood if students can hear a particular melody along with its transposition to another key. In a regular classroom lecture, the example is typically presented one or two times. Students do not have the opportunity to "replay" the melodies in a traditional lecture but can if the entire lecture is on-line.

A second advantage of on-line technology is the handling of quizzes. Quizzes are taken on-line and graded immediately. The content of the quiz is randomly sampled from a large item bank so that no two quizzes are the same. Students are permitted to take the quiz more than one time and only their highest grade is recorded. This "domain sampling" method of self-administered quizzes serves the function of helping the student review and learn the material more effectively (for example see Szpunar, K. K., McDermott, K. B., & Roediger, H. L. (2008). Testing during study insulates against the buildup of proactive interference. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 34, 1392-1399.).

3. How will instructor-student and student-student, if applicable, interaction take place?

WecCT e-mail will be the primary method of communication between the instructor and students. In addition, the Discussion tool will be used to supplement lectures. Students will also be provided with the instructor's office telephone number should computer-based communications fail.

4. How will student achievement be evaluated?

The evaluation scheme is shown above in the table that identifies the relationships among objectives, course content, and evaluation. The specific techniques include written assignments which require some integration and evaluation of the material covered in reading and the lectures. Each assignment will consist of several short essay questions. Quizzes will be self-administered and contain approximately 10 multiple choice questions. There will be one required quiz for each of the eight modules. Finally, there will be four examinations, each covering 2 modules. These examinations will contain approximately 50 multiple choice questions.

5. How will academic honesty for tests and assignments be addressed?

Two methods will be used to insure academic honesty. First, Turnitin, the University's plagiarism detection software, will be used to evaluate written assignments if plagiarism is suspected. Second, all quizzes and examinations will be constructed by randomly sampling from a large domain of questions (approximately 200 for each unit). As a result, no two students will take identical exams. In addition, all quizzes and exams will be displayed using colored fonts and backgrounds that make printing of the material illegible.

B. Submit to the department or its curriculum committee the responses to items A1-A5, the current official syllabus of record, along with the instructor developed online version of the syllabus, and the sample lesson. This lesson should clearly demonstrate how the distance education instructional format adequately assists students to meet a course objective(s) using online or distance technology. It should relate to one concrete topic area indicated on the syllabus.

Please see attached material which shows the PowerPoint slides for a lecture on the physical properties of sound.

Step Two: Departmental/Dean Approval

Recommendation: Positive (The objectives of this course can be met via distance education)

Negative

Mary Jo Smith 2/11/09
Signature of Department Designee Date

Endorsed: John D. Ed 2/16/09
Signature of College Dean Date

Forward form and supporting materials to Liberal Studies Office for consideration by the University-wide Undergraduate Curriculum Committee. Dual-level courses also require review by the University-wide Graduate Committee for graduate-level section.

Step Three: University-wide Undergraduate Curriculum Committee Approval

Recommendation: Positive (The objectives of this course can be met via distance education)

Negative

Gail Sechrist 3-10-09
Signature of Committee Co-Chair Date

Forward form and supporting materials to the Provost within 30 calendar days after received by committee.

Step Four: Provost Approval

Approved as distance education course

Rejected as distance education course

Gerald Antevren (m) 3/17/09
Signature of Provost Date

Forward form and supporting materials to Associate Provost.

**PSYC481 Special Topics
Psychology of Music
Online Course Syllabus**

Donald U. Robertson, Ph.D.
222 Uhler Hall
724-357-4522
durobert@iup.edu

PSYC481 – Special Topics: Psychology of Music

3c-01-3cr

Prerequisite: PSYC101 General Psychology

This course provides an overview of theory and research on the psychological foundations of music including music cognition, music perception, and the social psychology of music.

Course Overview

Music permeates our lives and, not surprisingly, services a wide range of psychological functions. It calms infants, gives identity to adolescents, evokes patriotic fervor, and deepens sorrow. Although much music is part of popular culture, there is ample evidence that music has been part of human experience for thousands of years.

One purpose of the psychology of music is to understand and explain from a psychological perspective the role that music plays. Beginning with the origins of music and its role in human society, we will examine how sound is transformed from physical energy to neurological activity. Neuropsychological and cognitive models provide a basis for understanding not only how music perception is organized, but also provide insights into general issues about human cognition and development. Although a great deal of recent research has focused on the neurological underpinnings of music cognition and perception, significant advance have also been made in fields that examine the relationship between music and emotion. Why does music elicit such strong emotional responses and what does the emotional response to music tell us about human emotion generally?

These, and other topics, are the focus of this course on the psychology of music. Because this is a course in the *psychology* of music, there will be a strong emphasis placed on psychological research and the empirical basis of conclusions. Students should have a basic background in general psychology and a firm grasp of basic principles of psychological research. A formal background in music theory is not required. However, in order to understand some of the issues in the field it is useful to have a rudimentary knowledge of music. The necessary music background will be provided for those topics. For example, octaves will be explained before a discussion of the psychological implication of octave equivalence.

Course Objectives

Students who satisfactorily complete this course will be able to:

1. Describe the origins of music and its role in society.
2. Describe the physical properties of sound and the sensory process of transduction.

3. Explain the psychological and neuropsychological basis for perception and processing of pitch, harmony, melody, and rhythm.
4. Describe factors related to development of musical ability and judge the relative contributions of talent and experience to musical development.
5. Identify psychological factors that influence music performance.
6. Summarize the relationship between music and emotion.

Course Content

The course is organized into four units with two modules in each unit. A module consists of assigned readings, homework assignments, a set of lectures, and quizzes.

Unit 1: Fundamentals of music

Module 1: Origins and functions of music (2 lectures)
 Readings: R & B 1, 2 and 3; Levitin Intro and Chapter 9.
 Complete two assignments and take one quiz

Module 2: Psychoacoustics (3 lectures)
 Readings: R & B 4; Levitin 1
 Complete two assignments and take one quiz

UNIT 1 Examination covers Modules 1 and 2

Unit 2: Music Cognition

Module 3: Models of Rhythm (2 lectures)
 Readings: R & B 5; Levitin 2
 Complete two assignments and take one quiz

Module 4: Models of Melody and Harmony (3 lectures)
 Readings: R & B 6; Levitin 3 & 4
 Complete two assignments and take one quiz

UNIT 2 Examination covers Modules 3 and 4

Unit 3: Music Performance

Module 5: Talent and learning (3 lectures)
 Readings: R & B 10; Levitin 7
 Complete two assignments and take one quiz

Module 6: Psychological factors and performance (2 lectures)
 Readings: R & B 7
 Complete two assignments and take one quiz

UNIT 3 Examination covers Modules 5 and 6

UNIT 4: Music and Socio-emotional Processes

Module 7: Emotion and music (3 lectures)

Readings: R & B 8; Levitin 6

Complete two assignments and take one quiz

Module 8: Social psychology of music (2 lectures)

Readings: R & B 9; Levitin 8

Complete two assignments and take one quiz

UNIT 4 Examination covers Modules 7 and 8

Course Grade

Course grade will be based on scores on examinations, assignments and quizzes. There will be four examinations each worth 50 points. The exams will consist of multiple choice and short answer questions; each exam will cover two modules. There will be 16 assignments, each worth 10 points. These assignments will consist of questions that require a brief essay answer. There will be two assignments for each module. The assignment questions are designed to require critical thinking and information integration across the PowerPoint lectures and reading assignments. Finally, there will be eight 5-point quizzes. These quizzes are designed to enhance learning rather than provide a rigorous method of evaluation. Each quiz will consist of 10 to 20 multiple choice questions. Students will be permitted to take the quiz an unlimited number of times and only the highest grade will be recorded. Immediate feedback will be provided for the quiz so the student can identify areas of weakness.

Examinations (4 @ 50 each)	200
Assignments (16 @ 10 each)	160
Quizzes (8 @ 5 each)	40
TOTAL	400 points

GRADING SCALE:

360-400	A
320-359	B
280-319	C
240-279	D
0-239	F

Course Materials and Procedures

1. Textbooks

Two textbooks are required for this course. They can be purchased through the Student Co-op Store or from an on-line source such as Amazon.com. Please note that there is a great deal of material

in the textbooks that will not be covered in the lectures. You are responsible for that material and will be tested on it. Keep up with your reading. Do not take a Unit test unless you have done the reading. The textbooks are:

Radocy, R. E., & Boyle, J. D. (2003). *Psychological foundations of musical behavior*. (4th ed.). Springfield, IL: Charles C. Thomas.

Levitin, D. J. (2006). *This is your brain on music: The science of a human obsession*. New York: Penguin.

2. Lectures

Each learning module contains several "lectures." These PowerPoint presentations correspond to classroom lectures and contain some information from the readings as well as unique material. When you view the lecture, be sure to have the sound turned on because much of the material is supplemented with sound files.

I encourage you to take notes on the lecture material just as you would in a traditional classroom lecture. Taking notes helps you process the information more deeply. Also note that the term "lecture" really means a lecture topic. The material covered in a PowerPoint lecture might be equivalent to two or three classes. Five lectures (one unit) correspond to material for about 8 hours of classroom time. You should spend about the same amount of time studying the lecture material for a unit.

3. Quizzes

Each learning module has a quiz that you should take. All quizzes will be available at the beginning of the course, but must be taken by a specific date and time. For example, the first quiz must be completed no later than {6/12/09 at 3:00am}, the second quiz no later than {6/15/09 at 3:00 am}. All deadlines are shown on the calendar. The quiz is comprised of a random selection of items from a large item bank. You can take the quiz as many times as you wish, but each time there will be a different group of items. The grade you receive for the quiz is your highest score. The purpose of these quizzes is not so much evaluation as it is educational. By taking the quiz several times you should get an idea of what areas you should study. Use the quizzes as a way of checking yourself.

4. Assignments

You will complete two assignments for each learning module. The assignments are written answers to questions that are presented in the lectures. You will answer two or three short essay questions. The essays will often require integration of the readings and lectures. Your response should be clearly written using correct spelling, grammar and punctuation. Part of the grade on the assignment will be based on those factors.

The time-lines for assignments are similar to those for quizzes. All assignments will be available at the beginning of the course but must be completed by a specific date and time and are shown on the calendar.

5. Exams

All exams will be available at the start of the course but must be completed by the indicated deadline. Note that unlike the quizzes, you will be permitted to take an examination one time. This is designed to be the equivalent of an in-class examination. You should not use notes or your textbooks as resources to answer questions. The total time to take the test will be limited and you will not be permitted to return to a question. These procedures are in place to insure integrity of the testing process which is necessary for fairness.

6. Communications

There are three ways that we will communicate with each other. The most frequently used method is WebCT e-mail. Everyone has an account and should check their e-mail daily. I will check my e-mail at least once a day and will respond to your requests. A second method of communication is through the Discussion Tool. We will use this forum for general questions about course content, comments about lectures and readings, and general discussion about psychology and music. If you have questions I encourage you to use the discussion board rather than e-mail so that others can benefit from the answers. I will also introduce discussion topics in lectures or in the discussion forum for comment by students. You should regularly check and contribute to class discussions. The last method of communication is rather old fashioned, but still has its place. You can contact me by telephone at 724-357-4522. If I am not available, you will get my answering machine and should leave a message. I will get back to you.

7. Technology support

IUP's IT group has a number of ways to contact them with technical problems. Contact them at:

IT Support Center Phone: 724-357-4000

e-mail: IT-Support-Center@iup.edu

Walk-ion: Suites on Grant Loer – Suite G35

Tutorials about WebCT are available at <http://www.webtct.com/oriented>

Also note that there is a link to IT on the course homepage.

Psychoacoustics: Properties of Sound

PSYC481: Psychology of Music

Sound

- Sound is the result of vibration
 - Vibration is a back-and-forth motion

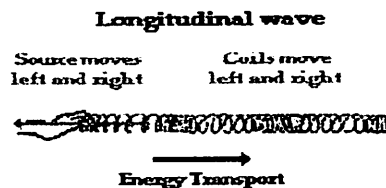
- Examples of things that vibrate
 - Subwoofer
 - Gong
 - Mosquito wings

Musical Sounds

- All musical instruments have something that vibrates
 - Strings for a guitar or piano
 - Reeds for an oboe or saxophone
 - Lips for a trumpet or trombone
 - Vocal folds for the human voice

Mechanical Waves

- Vibration gets transferred and creates waves
- Mechanical wave – transfers energy mechanically



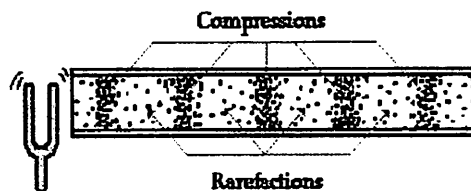
- Notice that the coil from the first push will take a while to reach the board

Air Pressure

- The air around us is filled with molecules
 - The more compressed the molecules, the higher the air pressure
 - The less compressed, the lower the air pressure
- Without a vibration, the air molecules distributed themselves evenly
 - This is called equilibrium

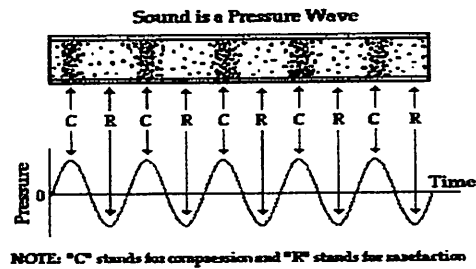
Sound Waves

- Vibration results in changes in air pressure
- Wave properties are the compression and rarefaction of air molecules



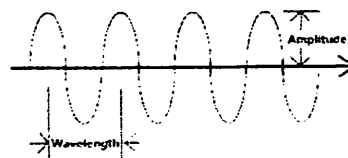
Sound Waves

- Can be represented as changes in pressure over time
- Pressure changes are departures from equilibrium



Wave Characteristics

- Idealized sound waves have a specific shape that is repeated over time.
- Two properties are amplitude and wavelength (frequency)



Amplitude

- Amplitude is based on the height of the wave
– maximum/minimum level
- The higher the wave, the greater the compression of the air molecules and the louder the sound
- Height of the wave is sound pressure and is measured in deciBels (dB)
 - dBs were named after Alexander Graham Bell, the inventor of the telephone

Common Sounds and dB

- dBs are really a psychological scale in which 0 dB refers to a barely audible sound
- Some sounds and dB levels
 - Soft whisper – 20 dB
 - Conversation (at about 1 m) – 60 dB
 - Shouting or heavy traffic – 100 dB
 - Loud thunder or average rock band – 120
 - Approximate pain threshold – 140
 - Loudest rock band on record - 160

Wave Length or Frequency

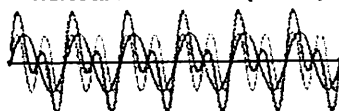
- Frequency – distance from one peak to the next
 - Measured in cycles per second or Hz
 - Humans can detect 20 to 20,000 Hz
 - Dogs: 50 to 45,000 Hz
 - Cats: 45 to 85,000 Hz
 - Bats: up to 120,000 Hz
 - Dolphins: up to 200,000 Hz
 - Elephants: 5 to 10,000

Complex Waves

- Nearly all natural sound has complex wave form
- If the wave form repeats, then
 - Fourier says
 - Any periodic oscillation curve, with frequency f , can be broken up into a set of sine curves with frequencies $f, 2f, 3f, 4f, \dots$, each with its own amplitude
 - Conversely, adding together this set of sine curves will reconstruct or synthesize, the original oscillation curve

Complex Waves (cont'd)

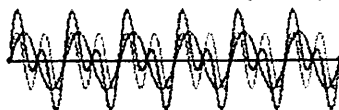
Wave Pattern for an Octave (in Green)



$f_{red} : f_{blue}$ is 2:1

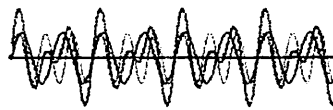
Complex Waves (cont'd)

Wave Pattern for an Octave (in Green)



$f_{red} : f_{blue}$ is 2:1

Wave Pattern for a Fifth (in Green)



$f_{red} : f_{blue}$ is 3:2

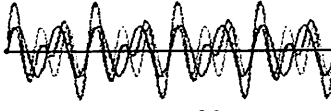
Complex Waves (cont'd)

Wave Pattern for an Octave (in Green)



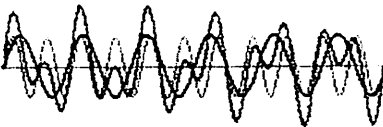
$f_{red} : f_{blue}$ is 2:1

Wave Pattern for a Fifth (in Green)



$f_{red} : f_{blue}$ is 3:2

Wave Pattern for Mere Noise



$f_{red} : f_{blue}$ is 37:20

Harmonic Spectrum

- Musical sounds are complex and have components or harmonics at frequencies described by Fourier: The 1st harmonic

Harmonic Spectrum

- Musical sounds are complex and have components or harmonics at frequencies described by Fourier: The 2nd harmonic



Harmonic Spectrum

- Musical sounds are complex and have components or harmonics at frequencies described by Fourier: The 3rd harmonic



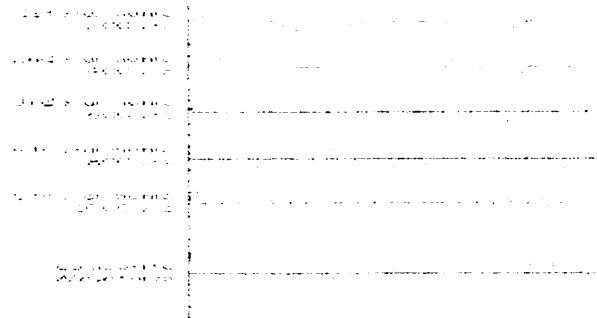
Harmonic Spectrum

- Musical sounds are complex and have components or harmonics at frequencies described by Fourier: 4th and 5th harmonics



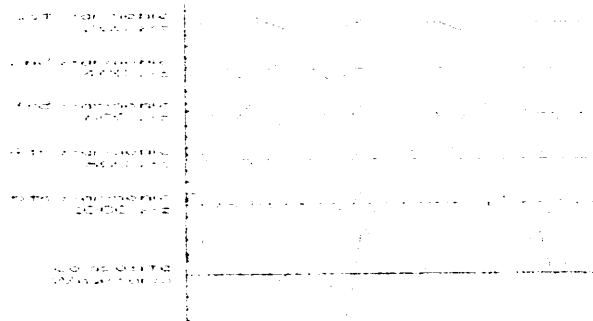
Harmonic Spectrum

- Musical sounds are complex and have components or harmonics at frequencies described by Fourier: The composite wave

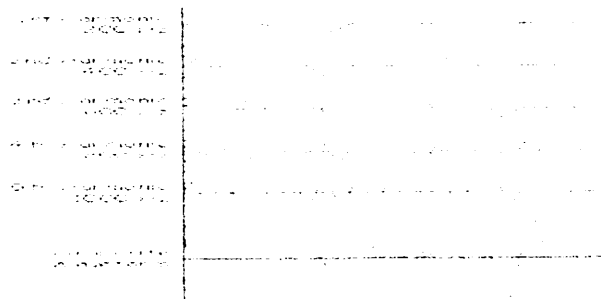


Harmonic Spectrum

- Note that the harmonic frequencies are multiples of the lowest harmonic: $f = 200$ Hz, $2f$ ($2 \times 200 = 400$ Hz), $3f$ (600 Hz), etc.



Harmonic Spectrum (cont'd)



- Also note that the amplitudes of the harmonics are equal and the composite is the sum of the individual harmonics

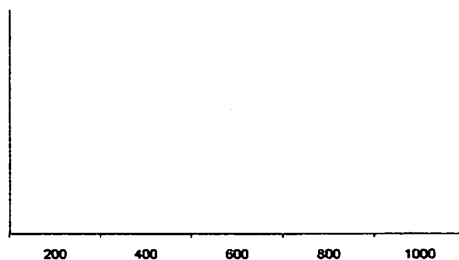
Harmonic Spectrum Representation 1

- Another way to represent a harmonic spectrum is to just show the amplitude for each component.
- For example, the previous spectrum would look like this:

200 400 600 800 1000

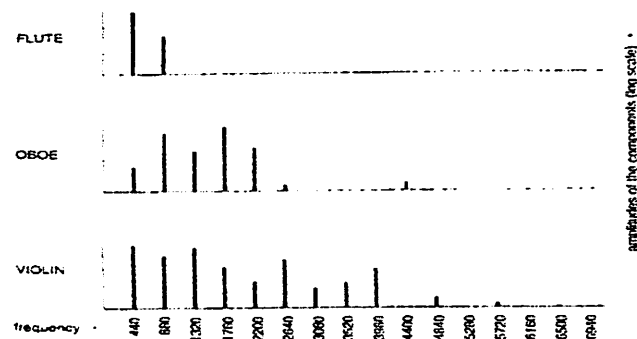
Harmonic Spectrum Representation 2

- Below is a representation of a complex wave in which the 2nd harmonic has half the amplitude and the 4th harmonic is absent.



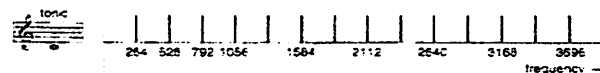
Harmonic Spectra for Different Instruments

- Here are illustrations of harmonic spectra for different instruments, each for the same tone – A 440 Hz
- Each line represents amplitude of the frequency



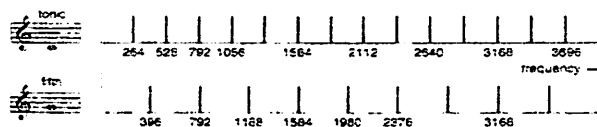
Harmonic Spectra for Two Notes

- Just as we added the waves for pure tones (the sine waves), we add complex waves to get the wave form of two complex tones
- Here is an illustration of a single tone (C₄ or 264 Hz) along with the harmonics



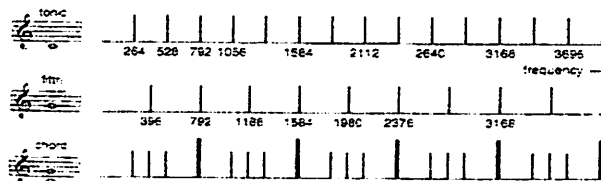
Harmonic Spectra for Two Notes

- Now look at the harmonic spectrum for a second note, G_4 , which has a fundamental (i.e., lowest or base) frequency of 396 Hz.
- Note that the 3rd harmonic of G_4 (1584 Hz) is the same as the 6th harmonic of C_4



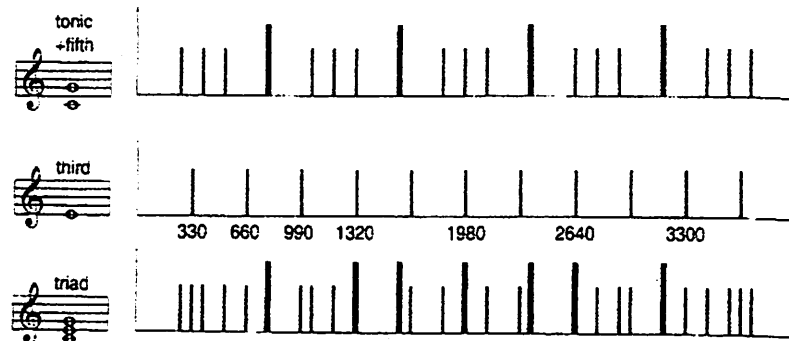
Harmonic Spectra for Two Notes

- When the two notes are played at the same time they form a perfect 5th.
- The "chord" shown below derives from the addition of the two spectra. Note the doubling of the amplitude of overlapping harmonics.



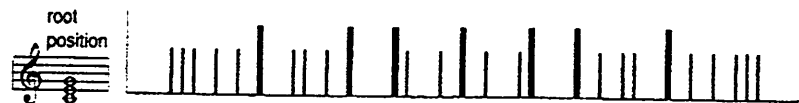
Harmonic Spectra for Major Triad

- Here is the spectral representation of three notes that form a major triad



Harmonic Spectra for Major Triad and Inversions

- Here is the representation of the same major triad (C major) but with slightly different arrangements of the notes. Root position:



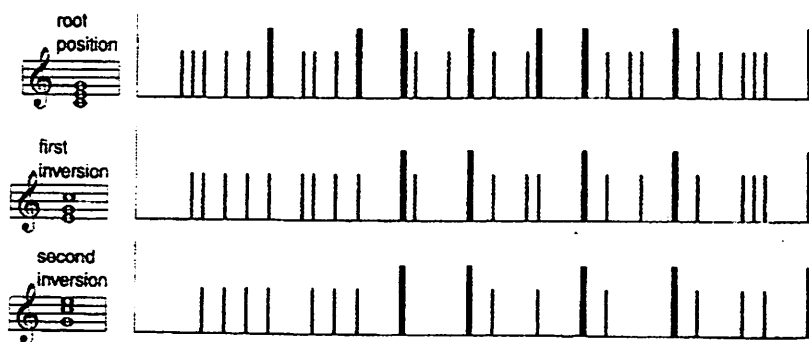
Harmonic Spectra for Major Triad and Inversions

- Here is the representation of the same major triad (C major) but with slightly different arrangements of the notes. First inversion



Harmonic Spectra for Major Triad and Inversions

- Note that the different sounds for the same cord are reflected by different doublings of the harmonics



Keyboard Correspondence

- The following slide shows the correspondence between keys on a piano and frequencies
- Note that octaves have doubled frequencies
- Also keep in mind that the actual sound wave of a piano note will contain harmonic frequencies

Correspondence to Keyboard

Frequency	Keyboard	Note name	MIDI number
4189.0		B3	108
4772.3		B3	107
5232.0		A3	106
5760.0		G3	105
6350.6		F3	104
6999.0		E3	103
7718.0		D3	102
8510.0		C3	101
9388.0		B2	100
10355.0		B2	99
11415.0		A2	98
12572.0		G2	97
13839.0		F2	96
15220.0		E2	95
16720.0		D2	94
18344.0		C2	93
20096.0		B1	92
21980.0		B1	91
24000.0		A1	90
26168.0		G1	89
28496.0		F1	88
30980.0		E1	87
33624.0		D1	86
36432.0		C1	85
39410.0		B0	84
42572.0		B0	83
45924.0		A0	82
49472.0		G0	81
53224.0		F0	80
57188.0		E0	79
61372.0		D0	78
65784.0		C0	77
70432.0		B-1	76
75324.0		B-1	75
80472.0		A-1	74
85884.0		G-1	73
91560.0		F-1	72
97512.0		E-1	71
103740.0		D-1	70
110264.0		C-1	69
117096.0		B-2	68
124248.0		B-2	67
131724.0		A-2	66
139536.0		G-2	65
147688.0		F-2	64
156184.0		E-2	63
165032.0		D-2	62
174240.0		C-2	61
183816.0		B-3	60
193768.0		B-3	59
204096.0		A-3	58
214800.0		G-3	57
225888.0		F-3	56
237360.0		E-3	55
249224.0		D-3	54
261480.0		C-3	53
274128.0		B-4	52
287172.0		B-4	51
300624.0		A-4	50
314484.0		G-4	49
328760.0		F-4	48
343464.0		E-4	47
358596.0		D-4	46
374160.0		C-4	45
390168.0		B-5	44
406620.0		B-5	43
423532.0		A-5	42
440916.0		G-5	41
458784.0		F-5	40
477144.0		E-5	39
496008.0		D-5	38
515388.0		C-5	37
535296.0		B-6	36
555744.0		B-6	35
576744.0		A-6	34
598296.0		G-6	33
620412.0		F-6	32
643096.0		E-6	31
666456.0		D-6	30
690492.0		C-6	29
715212.0		B-7	28
740628.0		B-7	27
766752.0		A-7	26
793596.0		G-7	25
821160.0		F-7	24
849456.0		E-7	23
878484.0		D-7	22
908256.0		C-7	21
938784.0		B-8	20
970072.0		B-8	19
1002132.0		A-8	18
1034968.0		G-8	17
1068584.0		F-8	16
1102984.0		E-8	15
1138180.0		D-8	14
1174184.0		C-8	13
1210996.0		B-9	12
1249628.0		B-9	11
1289084.0		A-9	10
1329368.0		G-9	9
1370484.0		F-9	8
1412436.0		E-9	7
1455228.0		D-9	6
1498864.0		C-9	5
1543348.0		B-10	4
1588684.0		B-10	3
1634880.0		A-10	2
1681944.0		G-10	1

Additional Information

- If you are interested in the physics of sound, check out the following site:
 - <http://www.glenbrook.k12.il.us/gbssci/phys/Class/sound/soundtoc.html>