

GEAR DYNAMICS AND GEAR NOISE SHORT COURSE

to be held at
Fawcett Center
The Ohio State University Campus
Columbus, Ohio 43210, USA

Taught by
Dr. Rajendra Singh, Dr. Ahmet Kahraman and Dr. David Talbot
NVH & Gear Education
<http://www.nvhgear.org/>

June 7 - 10, 2027
(Monday - Thursday)

GEAR DYNAMICS AND GEAR NOISE COURSE

- ***Gear Whine and Rattle***
- ***Transmission Error - The Main Source***
- ***Gear Noise Diagnosis***
- ***NVH Issues and Measurements***
- ***Gear Dynamics***
- ***Profile Design, and Manufacturing Issues***
- ***Application to e-drives or e-vehicles***
- ***Transmission Paths and Casing Acoustics***
- ***Design Guidelines for Noise and Vibration Reduction***
- ***Double Helical Gear Sets***
- ***Laboratory Tour***
- ***Demo of GearLab Computer Software***
- ***Interactive Workshop***

PURPOSE

The purpose of this unique short course is to provide a better understanding of the mechanisms of gear noise generation, methods by which gear noise is measured and predicted, and techniques employed in gear noise and vibration reduction. Over the past 40+ years about 2,700 engineers and technicians from over 400 companies have attended the Gear Noise Short Course. This annual course is taught in-person mode with no virtual component.

WHO SHOULD ATTEND

The course is of particular interest to engineers and technicians involved in the analysis, manufacture, design specification, or utilization of simple and complex gear systems. This course is valuable for industries such as automotive (including electric vehicles), aircraft, helicopter, ship, and off-road transportation; appliances; wind energy; process machinery; and general manufacturing.

The course material is covered in such a way that the fundamentals of gearing, gear dynamics, noise analysis and measurements are covered first. This makes the course appropriate to the gear designer with minimal knowledge of noise and vibration analysis as well as to the noise specialist with little knowledge of gears.

COURSE LECTURES (FIRST 3 DAYS)

A popular feature of this course is the interspersing of demonstrations with lectures. The extensive measurement and computer software capabilities of the Gear and Power Transmission Research Laboratory (GearLab) allow us to do this in a simple and non-commercial manner.

On the first day, the lecturers discuss why even perfect gears make noise. They present in both qualitative and quantitative terms how gear design parameters and manufacturing errors affect noise. The concept of gear transmission error, one of the major contributors to gear noise, is developed, and methods of predicting transmission errors

from design and manufacturing data are presented. Participants get a clear physical insight into the problems they face and how they may apply course knowledge to help solve their gear noise problems.

On the second day, lecturers concentrate on casing dynamics and acoustics, dynamics of parallel axis and planetary gears, transmission error calculations, gear excitations and measurements. The third day's lectures briefly discuss the sources and simulation models of gear rattle as well as spending several hours in the case history workshop. Roles of macro- and micro-designs along with effect of the spacing error will be discussed in some detail. Software verification and experimental validation issues will be briefly mentioned.

LABORATORY DEMONSTRATIONS ON DAY 2

Throughout the course, laboratory and computer software demonstrations are used to illustrate gear noise & vibration measurement and analysis techniques. The facilities of the Gear and Power Transmission Research Laboratory (gearlab.org) and the Acoustics and Dynamics Laboratory (mae.osu.edu/adl) are used for these demonstrations.

CASE HISTORY WORKSHOP ON DAY 3

This novel approach to discussing "real life" gear noise and dynamics problems has been used in this course since its inception. The workshop, which has been lauded by past attendees for its practical flavor, takes place on the third day of the course. The purpose of this workshop is to allow the course instructors and participants to interact and to discuss gear noise and dynamics case histories presented by course attendees. They are asked to present a brief synopsis of problems they have encountered or of a procedure they have used for gear noise analysis and reduction. Possible approaches to solve each problem will be discussed.

SIMULATION AND EXPERIMENTAL METHODS SESSIONS ON DAY 4

The sessions on Day 4 will address the following topics and related simulation or experimental methods:

- Effects of spacing errors on gear design and gear dynamics
- Geared system acoustic models: role of bearings, sound radiation
- Advanced gear excitation measurements
- Gear rattle and driveline transients

See web page (www.nvhgear.org) for more details including the typical agenda.

COURSE INSTRUCTORS

- **Dr. Rajendra Singh**
Academy (Emeritus) Professor and Director of the OSU Acoustics & Dynamics Laboratory
- **Dr. Ahmet Kahraman**
Professor and Director of the OSU Gear and Power Transmission Research Laboratory
- **Dr. David Talbot**
Associate Professor
- **Supporting Staff:** See the nvhgear.org for the names and bios of other experts and staff members

GENERAL INFORMATION

Registration:

1. Advance registration is required and should be completed as soon as possible. Payment form (via a major credit card) is posted on the web site. Applicants are usually accepted on a first come, first served basis. There are limited seats and thus the organizers reserve the right to limit admission to the best qualified.
2. Course payment must be completed along with or immediately after the registration to confirm the enrollment.
3. Relevant information on the agenda, nearby hotels, parking, airport transportation, etc. are posted on the web page (nvhgear.org).

Contact:

- Dr. Rajendra Singh (singh.3@osu.edu or singh@nvhgear.org) for registration information, technical content and workshop topics



REGISTRATION

Please register me in the **GEAR DYNAMICS AND GEAR NOISE SHORT COURSE**
June 7 – 10, 2027 (Monday – Thursday)

(please type or print)

Name:

First

(Middle)

Last

Name for badge:

Company:

Position:

Address:

City

State

Zip Code

Country

E-mail:

Work Phone:

Cell Phone:

**How did you
hear about us?**

Please register me for:

☐ \$2,900 per person – early bird rate (valid until March 8, 2027)

☐ \$3,100 per person – regular rate (from March 9, 2027)

☐ Special meals requested or dietary restrictions (please specify)

Payment of \$ _____ will be paid by:

☐ Check (payable to NVH & Gear Education)

☐ Major Credit Card (See next page; information needed is also posted on the web site)

***Note that we can NOT accept a purchase order.
Additional charges apply for invoicing, wire transfer, etc.***

☐ **Case History Workshop:** I would be interested in speaking briefly on the following problem or topic in the workshop:

Please send this form (and credit card information) to:

Prof. Raj Singh via email at (singh.3@osu.edu or singh@nvhgear.org)

Mail the check to: NVH & Gear Education, PO Box 3201, Dublin, OH 43016, USA

PAYMENT USING CREDIT CARD

FOR THE GEAR DYNAMICS AND GEAR NOISE SHORT COURSE

JUNE 7 – 10, 2027

☐ Course Fee: \$2,900 per person – early bird rate (valid until March 8, 2027)

☐ Course Fee: \$3,100 per person – regular rate (from March 9, 2027)

Notes:

1. Additional charges may apply for other requests such as invoicing, customized quotes, wire transfer, etc.
2. Purchase orders are not accepted.
3. Please contact Prof. Singh if there are any questions re alternate payment methods.
4. Seat(s) will be confirmed only after the payment has been processed.
5. Seats are limited in this annual course and thus early enrollment is encouraged.

Information needed for the credit card transaction

Card type (select one): ☐ Visa ☐ MasterCard or ☐ American Express

Account number: _____

Expiration date: _____ Month _____ Year

Card Verification Code: _____

The Card Verification Code (CVC 2, CVV2 or CID): a three-digit number located on the back of Visa or MasterCard cards; four-digit number on the front of American Express cards.

Cardholder (or Company) Name: _____

Cardholder's Phone Used for the Card: _____

Cardholder's Address: _____ (number and street)
_____ (city), _____ (state), _____ (zip), _____ (country)

- Amount to charge: _____ (in US Dollars)
- Name(s) of course registrant(s) covering this charge: _____

Email address for sending the transaction receipt: _____

Person completing the information (if different from above): _____

Date: _____ Signature: _____