

Adonyi Welding Consultants

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Subject: **Outline, Welding Engineering SHORT COURSE**

Following up on my previous proposal on the subject, besides indicating the topics to be covered, I would suggest choosing one of the four teaching levels for the subject short courses.

1. Level 1 (basic) aimed at welders, welding supervisors and welding technicians and 3-yr college grads.
2. Level 2 (intermediary) aimed at 4-yr degreed engineers, with some exposure to welding
3. Level 3 (advanced) aimed at MSc and PhD level scientists
4. Level 4 (interdisciplinary advanced) aimed at lawyers, accountants, purchasing agents, sales personnel, senior management.

In my experience, the level of teaching difficulty increases from 1 to 4. I have done WE training at all these levels, but most training was required at Level 2.

Please find attached a typical outline for Level 2, Appendix.

The courses typically involve eight hours of lecture, face to face discussions, testing and online follow-up. Dividing the course in two days worked best, with four hours of lecture, breaks, discussions and testing after lunch. Topics include:

- 1) Introduction to Welding and Materials Joining using my courses taught in the past 12 years at undergraduate Engineering education level. Textbooks: AWS Handbook Vol 1 and 2, 9th Edition, Welding Fundamentals by Robert Messler.
- 2) Welding metallurgy fundamentals (solidification and solid state reactions) applied to structural steels. Discontinuities and repair procedures. Case studies. Textbook: Sindou Kou, Welding Metallurgy
- 3) Welding Design fundamentals: residual stresses and distortions, plastic collapse vs. brittle fracture, destructive testing, fatigue and corrosion. Standards and specifications, with emphasis on AWS D1.6 code.
- 4) Welding Process Fundamentals, with emphasis on fusion welding (GTAW, GMAW) and solid state joining technologies (FSW). Textbook: AWS Handbook Vol. 1. 9th Edition

5) Non Destructive Testing fundamentals, principles of Fracture Mechanics and failure analysis, case studies. Textbook: ASNT Handbook, Vol. 1

After teaching this introductory course, more specific topics have typically been required by customers (focus on Pulsed GMAW welding equipment and process fundamentals and applications, Resistance Wire Seam Welding a.k.a as Soudronic welding, etc).

In case you need a more detailed course schedule, please let me know.

Please call at 903-235-5891 or e-mail in case you have any questions.

Regards,

Yoni Adonyi Ph.D., P.E.
Adonyi Welding Consultants

APPENDIX – Typical 2-day course schedule

DAY 1

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| I. Introductions, agenda, | 8:00-8:30 |
| II. Steel weldability/metallurgy fundamentals: HAZ and fusion zone cracking, | 8:30-9:30 |
| III. Gas Metal Arc process overview: power sources, consumables, technique | 9:40-10:30 |
| COFFEE BREAK | 10:30-11:00 |
| IV. Weld discontinuities: significance and avoidance | 11:00-11:30 |
| V. Case studies, failure analysis, | 11:30-12:00 |
| LUNCH BREAK | 12:00-1:00 |
| VI. Practicum: weld visual testing, standards, Mag Particle and Liquid Penetrant demos, high magnification microscopy of failures, | 1:00-3:00 |
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DAY 2

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| I. Q&A and monitored group discussions on concepts learned in Day 1 and new ideas on product design, manufacturing, and performance from a welding Engineering perspective | 8:00-10:30 |
| COFFEE BREAK | 10:30-11:00 |
| II. Individual student experiences | 11:00-12:00 |
| LUNCH BREAK | 12:00-1:00 |
| III. Testing, self grading | 1:00-3:00 |
| IV. Setting up online follow-up | 3:00-4:00 |