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DEPARTMENT OF ELECTRICAL & COMPUTER ENGINEERING

ECE 09.461
PROFESSIONALISM & CONSULTING IN ENGINEERING

LECTURE 3

PRELIMINARIES:
BECOMING A CONSULTANT

DR. ROBI POLIKAR
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- Identifying your skills (review)

- Identifying your clients

- Identifying your revenue model

- Determining your fee

- Marketing yourself, and getting your name out there

- Having a contract

- Communication skills

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- Make a list of everything that you think you have a particular knowledge or skill:
  - Any specific technical topic:
    - **Hardware design**
    - **Software design**
    - **An emerging topic (e.g., IoT, AI, blockchain, etc.)**
  - Use of a particular tool (typically a software platform)
  - Knowledge of certain standards
  - Knowledge of regulatory information
  - Anything that requires licensure or certification
  - Certain processes/methodologies/functions
    - **Remember: this need not be technical: tax preparation, project / personnel management**
  - Even perhaps a hobby – photography, carpentry, flying drones, art, ballroom dancing, can all lead to a type of consulting business.

- Further edit that list:
  - Which of these skills do you think are very common (more competition)?
    - **Working knowledge of Calculus, C++, Python, Matlab, basic circuit design**
  - Which of these skills are less common (less competition)?
    - **Complex software / hardware platforms, expert knowledge of Cadence or other EDA tools, or even ability to use common platforms to do uncommon things**
  - Which of these require some sort of additional training / certification (even less competition)?
    - **Licensure (P.E.), accreditation officer, security clearance**

- A specific industry
  - Companies that need technical know-how in a specific field

- A specific cohort of individuals
  - People who need specific skills/expertise for their own work

- A specific type of organization
  - Profit vs. non-profit organizations, government agencies, start-up companies, etc.

- Each has its own specific ways of doing business and pros & cons

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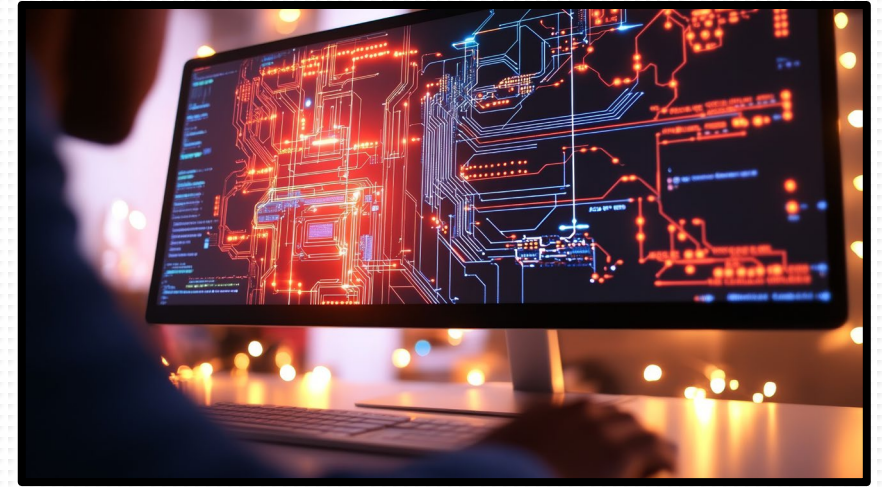
- ## How are you going to make money?
    - Fee for service – hourly rate
        - **The longer the project takes, the more you make – but there is no incentive to be efficient. Usually good for tasks you do not know how long it will take**
    - Project-based fee / fixed-fee
        - **One-time fee, the faster you complete, the higher your effective hourly rate**
    - Unit-based fee
        - **Make more money for each extra output (say, charge per person for a training program)**
    - Licensing: allow clients to use your prior work for (typically an ongoing fee)
        - **Good passive income (particularly if you have IP)**
    - Retainer fee
        - **Get paid a monthly fee to be on the call for immediate / emergency need**

- Obvious costs:
  - Personnel (if you are hiring people or subcontractors)
  - Use of software (subscription fees)
  - Use of specific, expensive tools: purchase and replacement costs
  - Materials and supplies you need to complete the project

- Hidden costs:
  - Use of phone, internet, and other utilities
  - Professional services: do you need to hire or retain
    - **An IT professional**
    - **An accountant**
    - **A tax consultant**
    - **An attorney / general counsel**
  - Travel: actual cost as well as opportunity cost (time spent on travel)

- You need to determine a rough hourly rate
  - Either because you are in fact charging by the hour
  - Or, if you are charging by project, you need a know approximately how long the job will take and charge accordingly.

- Big question:

HOW MUCH???

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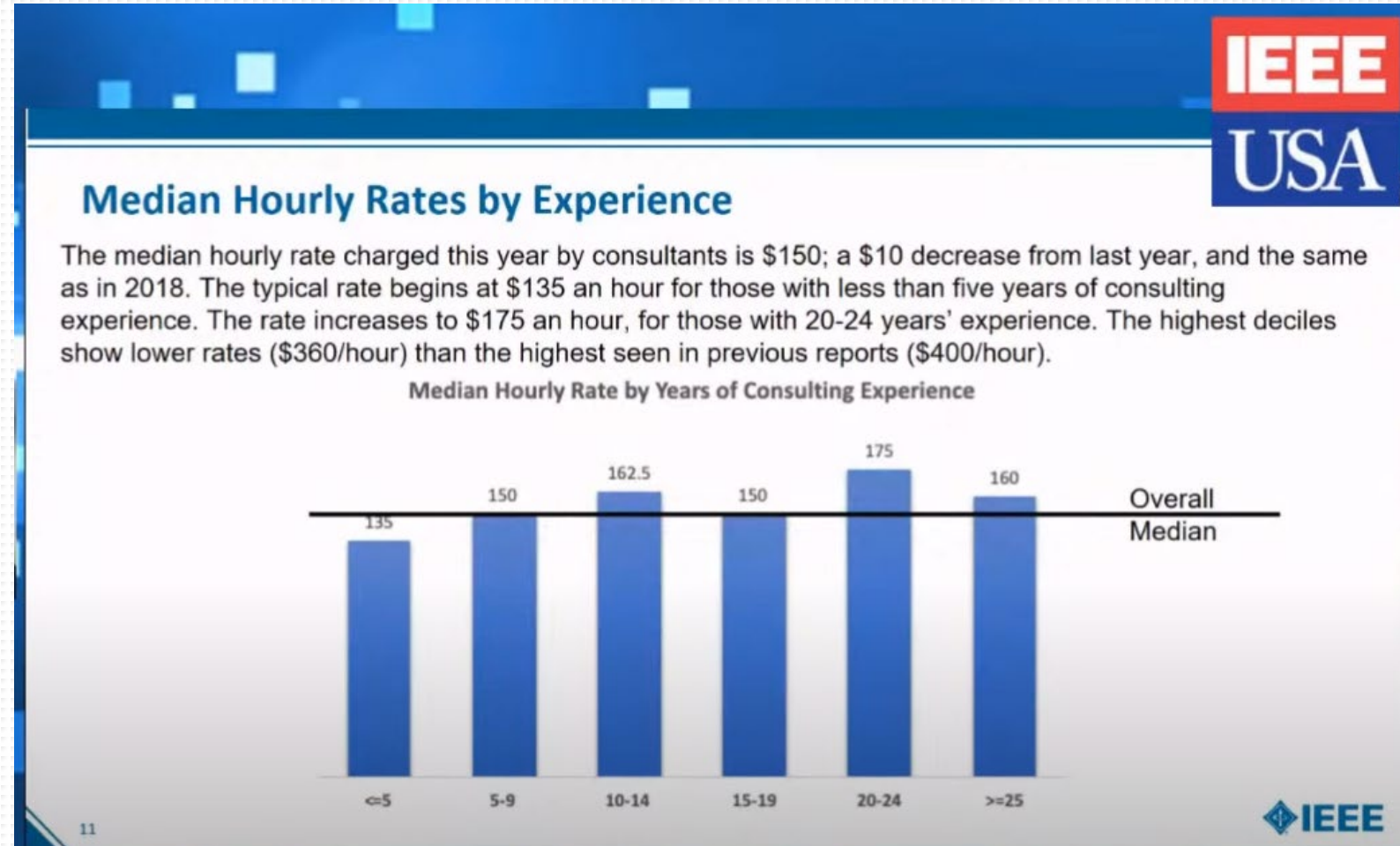
- If you are otherwise employed, start with your annual total compensation, such as salary + bonuses, etc.

- Multiply by three

- Divide by 2000

$$Your\ Hourly\ Rate = \frac{Annual\ Total\ Compensation \times 3}{2000}$$

- Why?
  - Why multiply by 3?
  - Why divide by 2000?

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- Median Hourly Rates by Experience

Median Hourly Rates by Experience

The median hourly rate charged this year by consultants is $150; a $10 decrease from last year, and the same as in 2018. The typical rate begins at $135 an hour for those with less than five years of consulting experience. The rate increases to $175 an hour, for those with 20-24 years' experience. The highest deciles show lower rates ($360/hour) than the highest seen in previous reports ($400/hour).

Median Hourly Rate by Years of Consulting Experience

<=5	5-9	10-14	15-19	20-24	>=25
135	150	162.5	150	175	160

Overall Median

2020 IEEE Consulting Survey:
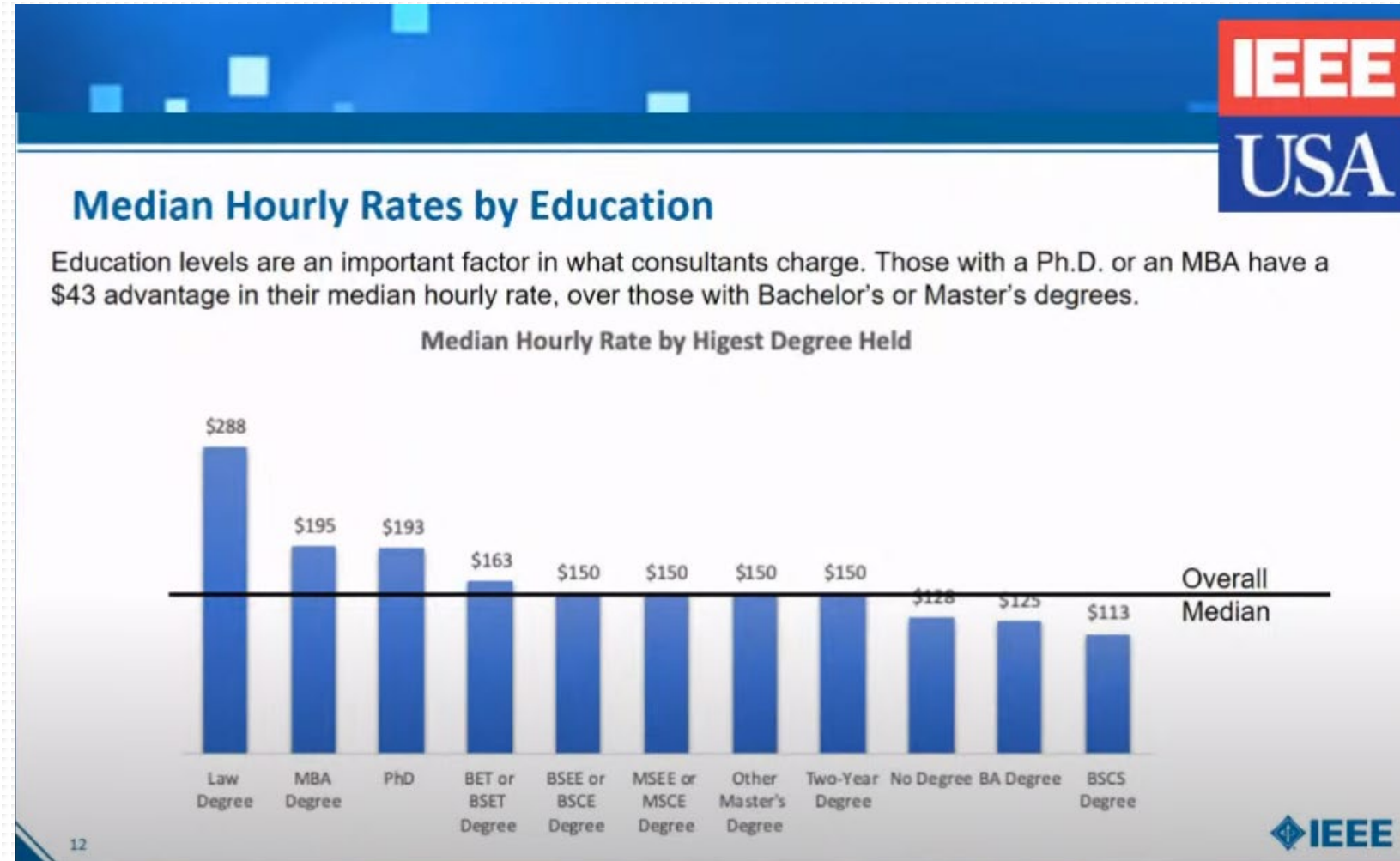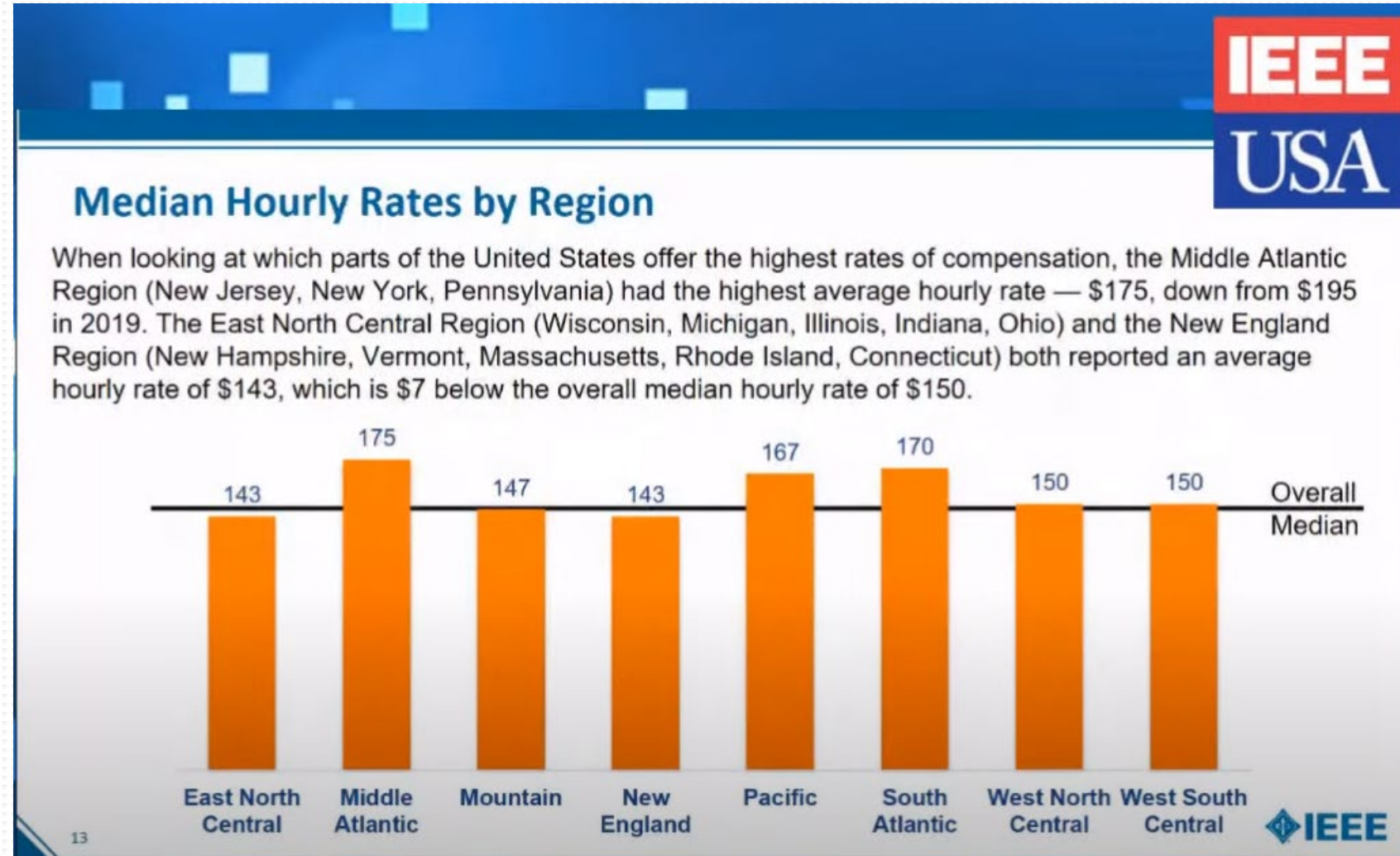https://www.youtube.com/watch?v=e3XQrB05jX8&list=PLiiJpBA_zVDnhpx0YULZIg0UZR8-fAcJC&index=3

- Median Hourly Rates by Education

2020 IEEE Consulting Survey:
https://www.youtube.com/watch?v=e3XQrB05jX8&list=PLiiJpBA_zVDn
hpx0YULZIgoUZR8-fAcJC&index=3

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- Median Hourly Rates by Region

Median Hourly Rates by Region

When looking at which parts of the United States offer the highest rates of compensation, the Middle Atlantic Region (New Jersey, New York, Pennsylvania) had the highest average hourly rate — $175, down from $195 in 2019. The East North Central Region (Wisconsin, Michigan, Illinois, Indiana, Ohio) and the New England Region (New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut) both reported an average hourly rate of $143, which is $7 below the overall median hourly rate of $150.

East North Central	Middle Atlantic	Mountain	New England	Pacific	South Atlantic	West North Central	West South Central
143	175	147	143	167	170	150	150

Overall Median

2020 IEEE Consulting Survey:
https://www.youtube.com/watch?v=e3XQrB05jX8&list=PLiiJpBA_zVDn hpx0YULZIg0UZR8-fAcJC&index=3

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- IEEE Released its 2024 Consulting Fee Survey

- Since 2020, the median hourly consulting fee for EE/ECEs has increased by $30 (20%) to $180/hour[1].
  - Those who hold an advanced degree, such as MBA, M.S. or Ph.D., charge even higher: $200/hour or more
  - Among EE/ECE, the highest fee is sought by those who work in power and communications, as well as systems engineering.
  - As for experience, the median for those with fewer than 5 years of experience was $140/hour, whereas for those with 25+ years of experience, the median fee was $200/hour.

- Most charge hourly (74%), with the remaining charging fixed price (22%) or per day (4%).

[1] 2023 IEEE-USA Consultants Fee Survey: Consultant Rates Up $30 Over Past Two Years, By Paul Lief Rosengren – Available at this link. Last accessed: 09/11/2024

- According to the 2023 Report, most common areas of consulting for ECEs are:
  - Systems Engineering (34%)
  - Project Management (27%)
  - Management (24%)
  - Electrical Power Systems (24%)
  - New Product Development (22%)
  - Technical Writing (21%)
  - Communications (21%)

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$$Your\ Hourly\ Rate = \frac{Annual\ Total\ Compensation \times 3}{2000}$$

- Average total compensation for an ECE by 5th ~ 10th year of employment is about $120,000.
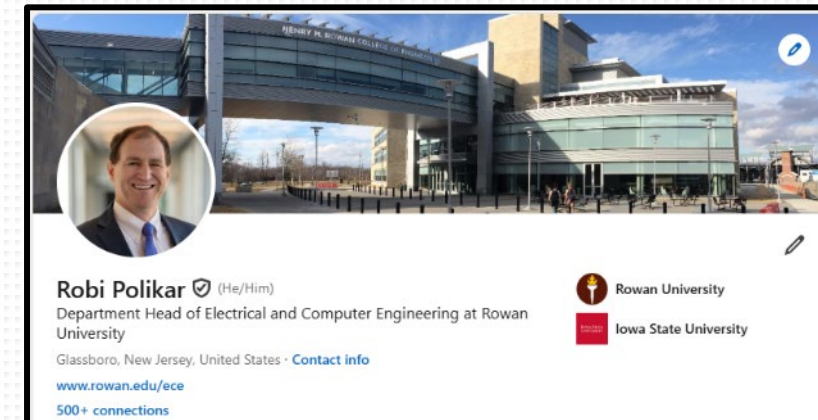
- This would result in an hourly rate of: $180

- Generally, do not charge a different rate to different customers
  - Clients may cross-check

- Be aware of discounts, rebates, tiered pricing
  - In general, avoid these except in rare, well-justified cases.
  - On occasion, consider offering your services free (more on that later).

- ## How will people find you?
  - □ This is, in part, why you have to identify your customers in the first place

- ## You need to go where your customers are
  - □ Do they attend specific conferences?
    - **Then go to those events**
    - **Better yet, get a speaking engagement at those events!**
  - □ Do they read specific trade publications?
    - **Subscribe to those and place ads in them**
  - □ Do they have active web / social media presence?
    - **Then, you should too – but you must commit to it**
    - **If your customers are on LinkedIn, so should you**

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- But beyond everything else, the one source that will get you clients is:
  - Drum roll…? No, no need for a drum roll – this should come at no surprise:

Networking!

- Networking is by far the most effective way to get your name out there and ultimately to find clients
  - More specifically, for clients to find you

- This is why you must take advantage of every networking opportunity
  - Conferences/trade events are great for networking
  - Friends/colleagues
  - Former employers (yes, former employers)!
  - Former clients!

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- But how do you make a name for yourself if you have not consulted before? How do you find your first client:

  - Be opportunistic: When you hear someone mentioning a problem that you may be able to help, tell them that you may be able to help

  - Tell your friends, peers, colleagues even (former or current) employer that you are consulting

    - **If you are employed, make sure that your employer is OK with your consulting activities**
    - **If you are a public employee, then you are most likely *required* to do so**

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- Consider offering your services for free (not reduced cost – free!) when you are starting out to get your name established.
  - Why?
    - If you do a good job, that first "free" client can get you many paid clients!
    - The best way to expand your client base is in fact getting referrals from your former or existing clients
    - In consulting, word of mouth can significantly grow your consulting business, but can also ruin it if you do not deliver.
  - Why free and not reduced cost or discount?
    - Discounts cheapen your image
    - Once given, the client will ask for a similar discount in the future for being a loyal client. Asking for a discount – again and again – is easy, asking for a free service is not!
  - Consider volunteering your services to a charity / not-for-profit organization
    - Their referral and good word may get you well-paying clients in the future

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- A well-written contract protects both you and the client.

- If you are able to afford one, or as your business grow, retain a contract attorney.
  - A good attorney can save you from a lot of headache down the line.
  - Hiring a contract attorney is a good and prudent investment in your own business.
  - If you cannot afford one (or until then - and even after then) use reputable online resources, **and** read/write every term very carefully.
  - Create your own "General Services Contract" (with the help of an attorney)
    - **Make sure to be fair, and protect your as well as the client's interest; a one-sided contract starts your engagement on an adversarial footing.**
  - Contracts are (usually) legally binding

- Anything that you or the client deems important.
- In general, <u>at a minimum</u>, the contract stipulates:
  - ▫ **<mark>Scope</mark>** and statement of tasks and services
  - ▫ Requirements, deliverables, timelines
  - ▫ Ownership of the work / intellectual property considerations
    - • Most work is "made-for-hire," meaning the client owns everything. If you have a specific IP, you need to protect it. Put it in writing ahead of time.
    - • Be aware of terms such as perpetual, global, worldwide, royalty-free rights, ability to sell to use your content, etc.
    - • Also be aware of nondisclosure, non-compete, non-recruit clauses/documents
  - ▫ Liability
  - ▫ Confidentiality
  - ▫ Compensation/consideration and terms of payment
  - ▫ Arbitration, state of law
- We will have a separate class discussing these issues in more detail

- In order for a contract to be legal:
  - There must be an offer/terms
  - There must be an acceptance
  - There must be awareness: both parties are aware that they are entering into a binding contract
  - Consideration: what each party promises to do
  - Capacity: each party must have the legal capacity to enter into an agreement
    - **Minors, for example, cannot enter into a legal agreement with a non-minor**
  - Legality: what is being offered, and the terms of the agreement must comply with the law.

- We will have a separate lecture on Contracts & IP issues later.

- Undoubtedly, one of the most important skills you need is that of professional communication skills.

- Your communication skills can make or break your professional career, consulting or otherwise

- Take the time, effort, and training to hone your oral and written communication skills:
  - Proofread all written communications
  - Rehearse (as much as you can) oral communications, in particular, planned important ones, such as negotiating.
    - **Take Dr. P's Frontiers in Engineering class** ☺

- You may have many different elements of written communications with your clients:
  - Preliminary/formal proposal
  - Contract
  - E-mail communications
  - Intermediary and final reports

- Make sure to maintain the appropriate, formal language in all of them

- Know the difference between e-mail and text messages
  - While e-mail is more formal, maintain professionality even in text messages
  - In e-mails: always have proper greeting, proper closing and – very importantly – proper subject line
  - Do **not** attempt humor **ever** in any form of written communication with clients.
    - **Why not?**
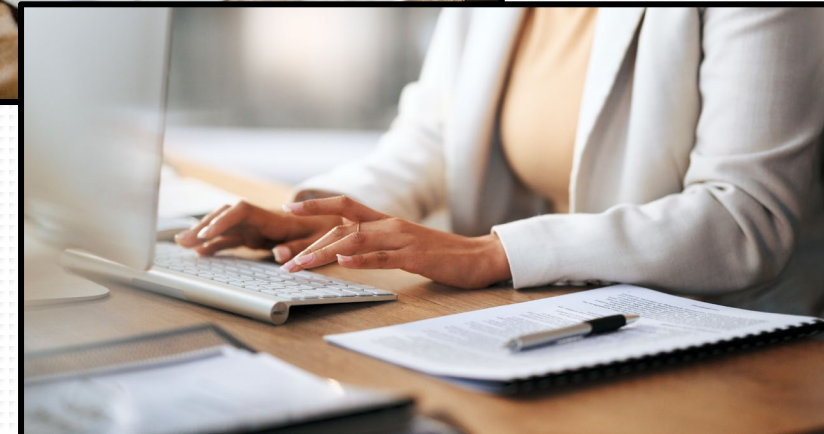
- Oral communication is a big part of consulting and professionalism – from networking to negotiating
- To be professional in your communication skills, you need to:
  - First and foremost: do your research about the client, the work that needs to be done, as well as your competition
  - Know key names in your field and in the client's organization
  - Be articulate
  - Be courteous
  - Be respectful
  - Be polite
  - Be aware of – and try to stay clear of – words, phrases, figures of speech, and jokes that may have unintended consequences or may be misinterpreted
- Be sensitive to (and knowledgeable about) local, cultural, and social customs and norms
  - Also, stay clear of hot-button issues (politics, religion), or better yet, any issue that does not relate to your professional work.

- Can an employer fire you for :
  - Saying something that is against his/her political views?
  - …or religious views? …world view? (PRW views)
  - Having a bumper sticker on your car that is against his/her PRW views?
  - Seeing a social media post that is against his/her PRW views?
  - Seeing you outside of work wearing a t-shirt with a message that is against his/her PRW views?

- How about a client? Can a client fire you for similar reasons?

- In professional settings, you may not always have an opportunity to clarify yourself or even to apologize

  - Or, even if you do, it may be too late, at least for that client;

  - But we all make mistakes, and when you do, it is important to make every effort to make it right even if it is late; better late than never.

WORDS MATTER!

- Certain words (or jokes) may be hurtful or trigger strong feelings or reactions, even if you did not mean to, or you meant no disrespect.
  - While intention is certainly important, what ultimately matters is what the other person hears, interprets or perceives
    - **Their perception is their reality**
    - **So, it is your responsibility to make sure that you speak clearly and professionally**

- Know that we all have our own implicit biases. <u>Recognize yours</u>, and work towards minimizing it.
  - Consider attending workshops and trainings on implicit bias.

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- Identifying your clients
  - Determine what kind of clients you wish to serve

- Identifying your revenue model
  - Hourly? Fixed price? Licensing? Retainer?

- Determining your fee
  - How much can you charge? Should you give discounts (no!)

- Marketing yourself, and getting your name out there
  - Conferences, trade shows, most importantly: networking!

- Having a contract
  - Have an attorney help you protect you, limit your liabilities, protect your IP. Spell out everything that pertains to your agreement with the client

- Communication skills
  - Be professional, courteous, respectful. Watch you say (and write). Be aware of (and minimize) your implicit bias. Be sensitive to cultural / social norms.

Complete and submit the Project Approval and Evaluation Form. Please provide as much detail as possible for

- Narrative Description / Scope of the Work,
- Requirements / Specifications,
- Constraints
- Deliverables, and
- Budget & Resources.

Provide the dates for

- project initiation,
- ordering the supplies/equipment,
- preliminary prototype/solution.

Make sure to sign and obtain the Client's signature on the left side, under Project Initiation.
Attach a Gantt chart. Lack of a Gantt chart will lead to a loss of points!

- Important notes on the Project Approval Form:
  - Requirements and specifications:
    - Technical engineering details on what needs to be done and how it needs to be done. They are the specific requirements your design (or approach, or method, or work) must meet.
    - In other words, these are things you MUST do to meet the client's needs.
  - Constraints:
    - Limitations and restrictions on how you must meet the requirements and specifications.
    - In other words, these are the things that you CANNOT do, or that LIMIT you in what / how you do your work.
  - Project deliverables
    - Specific items that you will provide and/or deliver to the client. Do not be vague!
    - A "report" or "advice" without additional clarifications is not an appropriate deliverable
  - Use additional pages if needed.
  - Must be signed by both you and the Client

- Important notes on clients:
  - Outside clients are welcome, so long as there is no real **or** perceived conflict of interest
  - Family members, friends of family members, supervisors / bosses of family members, significant others, people over whom you have power, or anyone with whom there may be a conflict of interest cannot be clients.
  - Other students, including graduate students, cannot serve as clients.
  - Clients must be professors, staff members (if within Rowan or an academic institution), and/or people with sufficient technical background and authority to oversee the proposed work (particularly if outside of Rowan).
  - Pet projects, hobbies, your own personal projects cannot be valid projects.

- To LLC or not to LLC?

- Structure, advantages, and disadvantages of different types of business entities:
  - Sole Proprietorships
  - Partnerships
  - Limited Liability Companies (LLC)
  - Corporations

- Starting a business in New Jersey